FLEXIBLE GROUPING WITHIN ELEMENTARY MATHEMATICS

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The purpose of this study was to uncover understandings, benefits, and disadvantages to implementing flexible grouping practices in elementary school mathematics instruction. Inquiry questions were used to examine the factors of perceptions, culture, collaboration, and teaching and learning within the implementation of flexible grouping. The results will be used to make decisions on flexible grouping practices and actions regarding teacher instruction and student learning in current and future implementation cycles of flexible grouping. A search for evidence regarding how teachers feel about flexible grouping, and identification of components teachers use when implementing flexible grouping practices was completed.

Action research was used, along with a mixed methods approach and examination of how flexible grouping was impacted by best practices that were identified within the research. Using the premise that action research actively involves the researcher in reflective practice, a study within the principal investigator's workplace allowed the school to focus on flexible grouping and discover strengths and weaknesses for improving student learning and teacher instruction. Three different methods were utilized to investigate the inquiry questions. One hundred thirty two participants, (a mix of teachers and parents) were studied using surveys, focus groups, and document collection. Focus groups and surveys provided perceptions and attitudes from each population group while gathering a basic understanding of flexible grouping within the context

of the school. Surveys provided baseline data about stakeholder understanding and perceptions of flexible grouping. Based on survey responses, focus groups were used for a further examination of study participants. Twenty staff members were surveyed who worked at the research site. One hundred randomly chosen parents from grades two through five were surveyed. Two focus groups were held with staff from the research site, three from grade three and three from grade four. A focus group with four parents of students that were enrolled in the school in grade five was conducted.

Document collection provided additional evidence and insights regarding flexible grouping implementation. Documents examined included: Teacher lesson plans, team meeting notes and agendas, student grouping documents, mathematics grouping calendars, teacher data analysis, state testing results, and local formative and summative testing results.

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PREFACE

The journey to completion of this dissertation was challenging, yet rewarding. This accomplishment would not be possible without many special people who supported me along the way. I would like to acknowledge and dedicate this research study project to my wonderful family and supportive friends. I am tremendously fortunate to have a loving and understanding husband, Brian, and two amazing children, Maura and Aidan, who all recognized and accepted that the time away from Mom would not last forever. I thank my parents, Nelson and Laura, who pushed me to reach this goal for myself. I hope I have made you proud!

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1.0 INTRODUCTION

1.1 PROBLEM AREA AND PROBLEM OF PRACTICE

1.1.1 Learning and achievement as related to grouping.

Traditional classroom grouping practices may create a potential problem area with regard to student learning. There are many aspects to the constructs of grouping practices that impact student learning and teacher instruction. I have analyzed a grouping practice known as flexible grouping and its effect on teaching and learning in an elementary school environment. In my experience, educators judge student success based on preconceived notions of individual student ability. I have had conversations with educators who tell me that students cannot be successful academically because of their home environment, their peer relationships, their IQ level, or because they believe the perceptions of other teachers. Researchers have found that academic labels often follow students from one year to the next. These labels become a means of tracking students from year to year, affect learning, and also hinder their academic growth if placed in lower ability levels (Schrank, 1968). Loveless (2013) acknowledges that American schools traditionally use grade levels to track students into different curriculums for each new academic year. However, Loveless (2013) also states that a shift has occurred recently as more classrooms are using ability grouping to help meet students' needs. Loveless (2013) also addresses recent

data from the National Assessment of Educational Progress (NAEP, 2011) calling attention to the increased use of ability grouping over the last 20 years. Ability grouping was at its lowest use in the mid 1990's, but after 2003, it increases dramatically in both math (40% to 61%) and reading (28% to 71%) (Loveless, 2013, p. 16-17). Loveless (2013) attributes the low trends in the 1990's due to the intense scrutiny regarding the practice of ability grouping. The dramatic increase after 2003 is suggested to come from several factors: the lack of scrutiny, the intensity of accountability systems, and the difficulty of teaching heterogeneous classrooms (Loveless, 2013, p. 19-20). These trends are important to note, as scholars continue to discuss the importance or negative impact of ability grouping and tracking for academic growth, achievement gaps, and labeling within the classroom environment (Loveless, 2013).

1.1.2 Learning as related to culture and climate.

The second problem area of focus pertains to school culture and mindset. The school communities I have worked in have had preconceived notions of what a school experience should resemble. These notions exist from past experiences that individuals have had from their own involvement with school. Teachers work within an existing shared culture and present shared beliefs, values, and norms regarding a school experience to the students they educate and also to parents and staff through their actions and conversations. These cultural norms potentially impact students' perceptions of their own abilities and the likelihood that they will stay motivated within their learning. A key factor to success in the classroom comes from the mindset of the students (Dweck, 2007). Teachers and parents can learn how to motivate children in ways that develop a growth mindset (Dweck, 2007). If the school experience is designed to motivate students, then I contend that students will have more academic success.

1.2 RATIONALE

1.2.1 Flexible grouping.

I maintain that student tracking and ability grouping based on an academic label will limit a student's individual potential, but through the use of flexible grouping methods, teachers will help students find academic success. Educators should reconsider assumptions that all learners grasp new skills using the same methods, at the same speed, and in the same environment. Educators cannot assume that a letter grade from the previous year is a measure of a student's current academic ability. It is important to also recognize the impact of teacher, student, and parent values, norms, and perceptions of education and learning. The culture of the learning environment may impact the success or failure of flexible grouping among the grade levels or the school entirely. A teacher's values and norms should reflect the school's norms in order to accurately send the correct messages about learning. It is also important to acknowledge how the school practices learning and how those practices might alter perceptions held by students, parents, and others in the community.

Flexible grouping is similar to the concept of differentiation, but with the dynamic that it is fluid, adaptable, and comprehensive by including all single grade level classrooms. Valentino (2014) defines flexible grouping in this way, "where students of varying ages, backgrounds, and abilities were grouped and regrouped to meet instructional needs". More specifically, I focus on the use of flexible grouping within the mathematics instruction of elementary students.

Within my own experience as a school principal, I have observed several different methods of mathematics instruction that utilize flexible grouping techniques. The teachers where I work have been exposed to a concept of mass customized learning (MCL), developed

within the book *Inevitable* (Schwahn & McGarvey, 2011). MCL is not a program and does not have one defined way of implementation. It could be compared to individualizing or personalizing instruction for each learner, but to do so en masse. It involves a great deal of student choice, individual pacing, awareness of preferred learning styles, mastery of skills, and using technology as a tool to support the process. To quote Schwahn and McGarvey (2014) from their website, they state that MCL:

> Presents a desirable and doable vision that allows learning systems to leave the Industrial Age, time-based approach to instruction and replace it with an Information Age, learning-based system that: Meets every learner at his/her learning level, provides learning opportunities that sync with the learner's most effective learning styles, and allows the learner to study and learn skills and concepts using content that is relevant and interesting.

MCL causes a major systemic change within the educational system if implemented with intentions mentioned by Schwahn and McGarvey (2011).

Our school has initiated unique adaptations of MCL, by incorporating elements of its design, in an attempt to address individualized learning. We have organized mathematics into single grade level flexible groups with components of MCL design. This system of learning has allowed teachers to customize instruction to individual student needs. This was an important initiative for the school because we identified that students' needs were not being adequately met. We also recognized that students do not acquire skills in the same manner or at the same pace. Our previous system of math instruction expected students to learn without considering their individual needs first.

1.2.2 Practitioner experience.

In grades one, two, three, four, and five teachers are analyzing pretest data regularly in order to identify singular skill needs for their students. The students see multiple math teachers in the same week based on academic need and also learn in a variety of methods and in some cases, pace. We have added an additional staff member (called a student learning assistant) who is a certified teacher, to create four teacher teams in certain grade levels that may only have three homerooms for delivery of mathematics instruction. Teacher schedules have common mathematics time across the grade so that they can share and move students every day when teaching mathematics. Often, the data analysis creates groups that are unequal in size. Group imbalances, both large and small, require creative use of staff or decisions about how skills will be taught so students receive the most appropriate instruction. When a large group of students require similar skill needs, then it is possible two teachers will team-teach that group. When a small group of students pre-test with certain skill needs, then they may be placed in a room with another group and differentiation might be used within the class. These decisions are made each time pre-test results are analyzed and can be flexible based on student need.

In grades two, three, four, and five, students take time before mathematics class, using teacher facilitation, to recognize which teacher they will see for that day's lesson based on pre-test results and individual student learning needs. This process utilizes pre-test results that students themselves begin to learn to analyze and make decisions about areas of strength and weakness. The students move to classroom locations, which involve different learning styles and pace. The learning environments are fluid and can change at any time. At times, students may move to a different room in the middle of a math lesson if the teacher feels the student is not receiving the level of instruction they need at that time to understand the content. Another

consideration is mastery of skills. Students often master skills at different speeds. Therefore, by utilizing flexible grouping, teachers can choose to spend an additional day on a skill while the other groups can do enrichment or application projects. These decisions require the teachers to collaborate about daily student learning.

In grade one, pre-test results are used within each topic to place students based on need. Students remain in those groups for a few weeks before being reassessed and moved for the next topic. Remaining in similar groups for several weeks is attributed to the needs of the age of the students. If a situation develops where a student needs to move groups within a topic, the teachers allow for such movement.

All of these aforementioned processes were developed by the teachers in order to improve the process of addressing the imbalance and lack of student growth across all student ability levels in mathematics. Obstacles that we have encountered within our building that surround the implementation of flexible grouping are: creating a culture that promotes flexible grouping habits, accurately analyzing data to increase student learning, principal led training for the staff on flexible grouping techniques, scheduling common math times for instruction to occur, increasing the number of staff to assist with each grade level mathematics time, and increasing the planning and collaboration time within grade level teams.

1.3 INQUIRY SETTING AND SCOPE

1.3.1 Research site and stakeholders.

The research site is a public elementary school located in a Pittsburgh suburb in Westmoreland County that enrolls 310 students. The average class size is around twenty students with two or three classrooms per grade level. This particular elementary school is one of five in the district. The staff has implemented flexible grouping practices in mathematics for over four years. Each grade level has the flexibility to alter their implementation of flexible grouping based on grade level and student needs. Pennsylvania System of School Assessment (PSSA, 2014, 2015, 2016) test data indicated the school achieved higher levels of achievement when compared to other schools in the district, county, and state. The school ranked in the top 4% of the state for achievement and growth compared to other elementary schools for the 2014-2015 school year (Schooldigger, 2016). This data suggests flexible grouping impacts student learning positively, but prior to this study, no research was conducted to confirm this problem of practice regarding how grouping practices and school culture impact teaching and learning.

Key stakeholders, central to the problem of student grouping, consisted of teachers and parents. These two groups of stakeholders have a share of the responsibility in the successful implementation of flexible grouping. I explored the role these two groups had in the process of flexible grouping implementation at the research site using surveys, focus groups, and document collection. I was interested in how the teachers implement flexible grouping in mathematics, their planning process, and their thoughts on its benefits and disadvantages. Focus groups and a variety of documents used for decision-making and planning such as lesson plans, team meeting notes, agendas, and data analysis provided insight on the information used to impact student

grouping and further planning. Parents added a valuable perspective to the flexible grouping process. Thus, their focus group provided an understanding of the benefits or disadvantages flexible grouping provides their children in mathematics. In addition, parents addressed experiences occurring in the home environment related to this learning process.

1.3.2 Inquiry Questions

Thus, the purpose of the literature review's analysis was to decide how flexible grouping affects teaching and learning in mathematics within an elementary school classroom.

Based on my problem of practice, the questions that guided my literature research are:

1. When utilizing flexible grouping in elementary mathematics, how do teachers and parents perceive the process?
2. Does school culture affect the implementation of flexible grouping in elementary mathematics?
3. Is there evidence that flexible grouping practices positively affect teaching and learning in the elementary grades?

The inquiry questions listed above allowed me to examine the factors of perceptions, culture, and teaching and learning within the implementation of flexible grouping. The results will be used to make decisions on flexible grouping practices and actions regarding teacher instruction and student learning in current and future implementation cycles of flexible grouping.

2.0 LITERATURE REVIEW

2.1 FRAMEWORK

Dweck and Reppucci (1973) studied how the theory of learned helplessness transferred into classrooms with young students by studying elementary age children and their motivation for success and growth. Using a study with fifth graders, Dweck and Reppucci (1973) analyzed the effect of failure when a "low expectancy of reinforcement" (p. 110) was provided to certain students. The study aimed to show that students who gave up more easily or lost persistence, as compared to others, believed that success or failure was solely due to their ability. The students in the study also believed that effort was not responsible for success or failure. Conversely, students who persisted through challenges believed this was due to actions and effort, not ability (Dweck & Reppucci, 1973, p. 110). A key finding in further research states "children who attribute their failure to lack of effort [instead of ability] do not show deterioration in performance and often show improvement" (Diener & Dweck, 1978, p. 451).

Two views of intelligence that Diener and Dweck (1978) call "helpless" and "mastery oriented" (p. 460) are amazingly different in the "cause of, versus the remedy for, failure" (p. 460). Even more interesting is that in a later study, Diener and Dweck (1980) found that children termed 'helpless' view failure as part of future performance and children termed 'mastery-oriented' view success as part of future performance (p. 950). Through these two

views, Dweck (2007) now terms the two divisions of intellectual growth as the "fixed mindset" and the "growth mindset" (Dweck, 2007, p. 39). Students that have a fixed mindset avoid challenges, lack self-confidence and effort, and feel powerless when mistakes are made. On the other hand, students with a growth mindset want to learn, enjoy hard work, and thrive through mistakes. Teachers and parents often praise students in ways that promote the fixed mindset. For example, praising children for their intelligence instead of their effort often generates less interest in challenging assignments (Dweck, 2007, p. 42).

Brooks and Brooks (1999) apply a constructivist theoretical approach to how learning is achieved in the classroom. A strong stance presented in their work is learning is not controlled by the teacher, but instead by the learner (Brooks & Brooks, 1999, p. 21). In addition, Brooks and Brooks (1999) contribute to the learning analysis of Dweck in that our educational priorities should shift from teaching children concepts, to teaching children by how they are motivated to learn. They contend that a constructivist approach should include five key elements: a student's point of view, challenge and rigor, relevant activities, big ideas, and daily assessment (Brooks & Brooks, 1999, p. 21). Customization and how each student learns best, similar to beliefs of Schwahn and McGarvey (2011), become a priority for the learning environment along with a true "focus on student learning" and design of "instructional practices to help students learn" (Brooks & Brooks, 1999, p. 24).

I believe these two frameworks can be used as a guide for beneficial learning and grouping. Teachers and parents can learn how to motivate children in ways that develop a growth mindset. Using Dweck's (2007) and Brooks and Brooks (1999) work as an influence, two key factors to success in the classroom come from the mindset of the students and providing an environment in which learning is customized to each student. How will flexible grouping, as

I plan to analyze through the lenses of grouping practices, instructional and climate variables, and the context of culture, impact students' perceptions of their own abilities and affect the likelihood for success along with individual motivation for learning?

2.2 GROUPING PRATICES

2.2.1 Ability grouping and tracking.

My literature research examined multiple differences around grouping practices. I have read studies on tracking, ability grouping, with-in class flexible grouping, and between-class flexible grouping. Many of the studies define the grouping practices in specific ways. The literature offers many resources surrounding the topics of ability grouping and tracking. Slavin (1985, 1987, 1993) has done an immense amount of research around tracking and ability grouping. In a study by Slavin and Karweit (1985), they used field experiments to examine three different grouping practices across two different school environments in order to compare the differences and/or similarities in mathematics achievement results. One school had a diverse urban population and the other school had a rural white population with little diversity. Three grouping treatments were randomly assigned to their teachers and classrooms. The three treatments studied were termed whole group instruction, ability grouped active teaching (AGAT), and team assisted individualization (TAI). It was hypothesized that the AGAT and TAI would be more effective for students on each end of the learning spectrum vs. whole group instruction which would better benefit the average learner. Quantitative data was collected using multiple measures and statistical analysis was done to find statistically significant results.

Attitude scales were administered to the students for pre and post instruction. Qualitative implementation checks were done by classroom observation. Remarkably, the results did not exactly follow the hypothesis. AGAT and TAI did increase achievement and skills more than whole group instruction. However, no statistically significant differences were found between the AGAT and TAI, even across both experiment schools. There were some limitations mentioned with pre-test differences that caused concern about the impact on the statistical significance of the results, however, the researchers felt it could be eliminated as a concern. Slavin and Karweit (1985) acknowledge the potential of grouping practices by stating, "that if problems of management and motivation inherent in attempts to accommodate student heterogeneity can be solved, then such methods may be able to achieve the outcomes for which they were designed-enhanced achievement for all students" (p. 365). Several years later, Slavin (1993) speaks against ability grouping because he felt that it was a form of labeling or categorizer in which students were sorted into groups that became extremely difficult or impossible to avoid or remove.

2.2.2 Flexible grouping connected to implementation and achievement.

Several researchers and scholar practitioners have studied the concept of flexible grouping and discuss its application within a variety of grade levels (Castle et. al., 2005; Gamoran, 2011; Tieso, 2004). Castle, Deniz, and Tortora (2005) conducted a study that supports the positive effects of flexible grouping, particularly for below-goal students (p. 147). Their study examined the relationship between flexible grouping and student achievement. Their research questions focused on an increase of student mastery due to flexible grouping, teacher implementation of flexible grouping practices, and flexible grouping contributions to student

progress. Citing Miller (1995), the framework incorporates child development theory, focusing on the large difference in child development rates. Also important is the perspective that within one single classroom there are a wide range of needs and a variety of abilities. Castle, Deniz, and Tortora (2005) also address the negative effects of ability grouping, citing multiple research studies to support this theory. A longitudinal study was used over a five-year period to focus on literacy and the incorporation of flexible grouping within one elementary school. The entire staff was trained and coached, over five years, on how to incorporate flexible grouping practices consistently. The students involved in the study were classified as below-goal and the school was a high needs school. Quantitative data collected consisted of standardized tests, reading inventories, and writing prompts for the students. Qualitative data sources such as teacher interviews, implementation ratings by school personnel, and lesson plan documentation were used. The results show increases in mastery in six of the seven comparisons. By year five, 95% of the teachers implemented flexible grouping on a weekly basis. Interviews also showed that teachers noted improvements in student confidence, focused instruction, and ability to keep student attention due to flexible grouping practices. Teachers also claimed instruction was needs based. Castle, Deniz, and Tortora (2005) acknowledge that more research is needed with the relationship between flexible grouping and student achievement.

2.2.3 Between-class flexible grouping.

Gamoran (2011) writes about key elements of between-class flexible grouping. He explains the method of "diagnosis and instructional response" (Gamoran, 2011, p. 115) as requiring the ability to discover students' needs, properly group students according to their needs, and then instruct them appropriately with targeted learning opportunities (Gamoran,

2011). Gamoran's (2011) work addresses the literature regarding tracking and grouping of students. "Diagnosis and instructional response" (p. 115), can be a way to document needs and then target instruction to those specific needs. Gamoran comments on the lack of formalized studies and theory involving this particular approach. When left without formal structures, most attempts at such a response fail and turn into ability grouping with unsuccessful results. He refers to recent work by Conner et al. (2004a, 2004b, 2007, 2009) that addresses the link between instruction and achievement growth. Conner and her colleagues (2004a, 2004b, 2007, 2009) studied skill based grouping and specific software, A2i, which was used to identify areas of need. Gamoran (2011) states that "flexible skill grouping" (p. 117) uses formative assessment and must occur frequently enough to be able to properly respond to student needs. He cites work from Slavin (1987) that supports appropriate use of grouping, if implemented using appropriate skill targets and flexible movement. Interestingly, Gamoran (2011) suggests the need for more sociological research that would incorporate the concept of instructional differentiation. His writing alludes to the approach of optimal matching of teachers and students. This specifically speaks to whether certain teachers are more effective with a certain achievement level of students. In Gamoran's (2011) concluding statement, he writes that Conner and her colleagues' work provides a model that may be transferable into practical application. Gamoran (2011) acknowledges the importance of recognizing the work was done for one specific content area and also age range. However, Gamoran (2011) states that Conner and her colleagues' (2004a, 2004b, 2007, 2009) work has the potential to address all learners and is transferable to different settings and contexts.

2.2.4 Flexible grouping pertaining to curriculum and instruction.

Tieso (2004) conducted a study incorporating flexible grouping practices and found that selecting appropriate and non-permanent forms of flexible grouping might have a "positive impact on students' mathematics achievement" (p. 81) if choices are made that include gifted education pedagogy, differentiated instruction, and sound curricular decisions for the learners. The study examined the combined effects of grouping practices and curricular adjustments on elementary students' mathematics achievement. The research statistics show significant differences in between-class grouping, flexible grouping, and curricular adjustments. Two hypotheses in Tieso's (2004) study anticipated gains in classrooms of students who were taught using adjusted curriculum or, ability grouped with differentiation, versus classrooms where whole group instruction was used. Statistical analysis results showed that curricular revision produced significantly better results than the comparison groups. This includes the fact that no additional grouping practices were needed for these gains. Altered grouping practices coupled with curricular changes also produced significantly better results than the comparison groups. However, a study limitation showed the low level groups were targeted for additional focus, and it was difficult to compare two groups with different initial pre-test scores to determine how much growth was made.

2.2.5 Other flexible grouping models.

Researchers frequently cite a grouping practice known as the Joplin Plan. Cecil Floyd discussed the Joplin Plan in the 1950's. The Joplin Plan is best summarized as between-class grouping, but also across grade levels. At the time, this was not called flexible grouping, but in

its description, is very similar to the definition used today. Powell (1964) summarized the findings of Floyd's study, which showed that every research question asked regarding the Joplin Plan in the study was not shown to cause an increase in student achievement over self-contained classes. This is an interesting result, as it negates the benefits of flexible grouping. Powell (1964) acknowledges that more research was needed using the variables surrounding between-class grouping before validating its elimination.

A dissertation study completed by Wilds (2014) conducted a qualitative analysis on teacher perceptions of between-class flexible grouping. Wilds (2014) did his research within his own school setting, utilizing teachers in the third grade who implemented the flexible grouping strategy in math. Interviews were transcribed and he identified themes in order to associate coded descriptions. A focus group was also held for teachers that had taught third grade in the past. Both interview results and focus group feedback stated positive themes and benefits to the flexible grouping model. Wilds (2014) was working as one of the teachers, therefore, limitations on his results included his bias and also the motivation from other teachers to participate in his research. Both interview results and focus group feedback showed positive themes and benefits to the flexible grouping model.

2.3 CULTURE AND CLIMATE

2.3.1 Learning environment and its relationship to grouping practices.

When a school pursues different norms, values, or expectations of educating students that alter past experiences, they are altering the school culture and also how the community understands the school culture. This impacts how parents, students, and teachers view the school experience. Grouping students for different circumstances, even just within a grade level, can be a way in which a school changes culture. Tice (1997) addresses why cultural changes in the field of education do not have a firm stance on what form of grouping serves students best. One reason this has not been addressed properly relates to, "deeply dividing values issues and to associated matters of organizational and social policy" (Tice, 1997, p. 47). School culture, even specific to how teachers group students based on educationally formed decisions, is impacted by the organization, policy, experience, and the belief system of a school.

In focusing on the element of culture within a learning environment, I examined the research with schools that have employed flexible grouping strategies during mathematics. In doing so, the school may have altered the culture within the school setting. Flexible grouping is uniquely different from tracking or ability grouping in that students are not permanently placed within a specific classroom or academic level. Utilizing flexible grouping aims to keep students motivated and challenged with each skill. Skill attainment is the focus of placement and individualized and customized instruction is the focus of lesson planning. Carol Dweck's (1986) research on motivational patterns suggests the importance of keeping students motivated and challenged so that they do not develop a "helpless" (p. 1040) mentality in which they display "challenge avoidance and low persistence in the face of difficulty" (p. 1040). It is important to

note that the change in grouping practices greatly affects the students', parents', and teachers' opinion of the culture within the school. Oakes's (2000) research justifies reasons for avoiding tracking or ability grouping. Tracking creates an internal school culture that becomes negative and self-prophesizing. Oakes (2000) states, "pace and coverage differences result in some children falling further and further behind…they likely internalize the judgment that they're less able and less likely to succeed" (p. 18). Oakes (2000) recognizes that students "withhold the hard work it might take to do well" (p. 18) which directly relates to an academic culture that could exist within a school using tracking or ability grouping.

2.3.2 Perceptions of learning as related to grouping practices.

Culture within an educational setting is also affected by perceptions of learning. Students, parents, and teachers all have perceptions of learning that occur within the school and also outside the school. Dweck (1986) found that learning is not dependent on ability, but instead on motivation. "Measures of children's actual competence do not strongly predict their confidence of future attainment" (Dweck, 1986, p. 1043). Knowing that motivation is a larger factor in student's attainment or mastery of skills, flexible grouping practices in the school need to more adequately measure and reflect student motivation for group placement. In addition, a teacher's perception or even impression about a student's ability actually affects "students' performance such that the students' performance falls more in line with the teachers' expectancies" (Rosenthal & Jacobson, as cited in Dweck, 1986, p. 1045). The ultimate goal within the school is to have a learning culture that values differences in learning settings, provides motivating learning environments, and supports students as they work toward growth and success. Flexible grouping, mentioned by George (2005), encourages interactions with

different sets of peers. This varying interaction eliminates the perceptions of tracking or ability grouping and enables the school culture to embrace learning for skill need and not on preconceived ability.

2.3.3 Cultural factors that relate to grouping practices.

Tieso (2004) found in her study that three key factors must be addressed when utilizing flexible grouping practices within a school. One of the factors relates directly to a culture that exists within the school. Teachers must "be aware of students' different levels of prior knowledge and cognitive abilities" (Tieso, 2004, p. 82). Teachers who recognize a student's place in his/her learning help to internally motivate that child with his/her learning experiences. Knowing that a child will be able to get the right learning at the right time, utilizing flexible groups, allows each learner to better address his/her needs. According to Dweck (2007), this positive academic recognition builds internal motivation, persistence, and willingness to take on challenges and grow through difficulty.

Another cultural factor that impacts the success of flexible grouping is the teacher's awareness and ability to recognize and analyze individual differences and abilities. Individualization of learning and the ability of the teacher to accurately address a student's needs allow for appropriate skills and learning to take place at the right time. If this process becomes a part of the culture within the school, the teachers should regularly address student needs by analyzing data in order to group students based on those results. The grouping becomes flexible when the data indicates the needs of the students are not the same. The students can then be grouped based on their understanding of specific skills. George (2005) contends that when

teachers are made aware of individual differences they can provide more opportunities for growth and development (p. 187).

2.4 RESOURCES

2.4.1 Distribution and decision-making.

Schools need the necessary resources when employing any strategy, program, process, or learning environment. Proper resource distribution and usage of those resources becomes important to guarantee individual needs are met for all learners. Tice (1997) contends that educational grouping also requires appropriate resources. Making the correct decisions about allocating money, hiring staff, and utilizing other common public school investments are important when altering the school experience. However, when educating a group of students, educators and the school system must have knowledge about the beliefs and values of the community. The norms the school believes in carry as much importance as the allocation of resources. "These are not to be registered simply as matters of funding; most are matters of allocating resources already available, which would at least take us, let us say, half way. To go the rest of the way to maximize value for children, youth, and society requires additional public investment" (Tice, 1997, p. 47). George (2005) expresses concern that when traditional grouping occurs, resources are not spread equitably. This includes teachers and other tangible resources. To combat this concern, flexible grouping requires constant communication and collaboration on the part of the teaching team, which in most cases includes the sharing of resources and ideas.

2.4.2 Staff as a resource.

The knowledge and skill of the teachers that engage in flexible grouping can also be considered resources. The teaching staff is the most important resource that a school employs. Engaging in flexible grouping is not an inherent skill for teachers and most teachers require learning and growth on their part. Analyzing data, examining individual learner needs, and planning lessons designed specifically for different groups of students requires skill and development. Similar to the concept of differentiation, flexible grouping requires ongoing planning and organization. Brimijoin (2005) stresses the importance for the proper funds and additional resources to be earmarked for staff to have the time to share best practice, collaboratively learn, and grow in their ability to properly employ those practices (p. 260).

2.5 RESEARCH CONCLUSIONS

Researchers agree about the value and importance of incorporating flexible grouping practices into classroom instruction. The researchers used different variables to support the use of grouping practices. Flexible grouping, specifically, appears to be more beneficial for student growth and learning, when compared to tracking or ability grouping (Slavin, 1985, 1987, 1993; Castle et. al, 2003; Conner et. al, 2004a, 2004b, 2007, 2009; Gamoran, 2011; Tieso, 2004; Loveless, 2013). Additionally, the research literature also addresses the importance of additional variables that must be coupled with the implementation of flexible grouping. These variables include the use of data, collaboration, school culture, appropriate resources, and the mindset of the students involved. It appears that school culture does impact the implementation of a

grouping practice, including flexible grouping between elementary classrooms. Culture, as a social context, is highly influenced by all stakeholders involved in the educational setting. For beneficial flexible grouping practices to occur, the norms and values engrained within the school environment should reflect a "growth mindset" (Dweck, 2007), recognize the importance of positive student motivation, and value flexible grouping as a true benefit to student learning. Ultimately, growth mindset thinking on the part of the students and the teachers should promote motivation so that student development, persistence, and growth become a part of each learning experience (Dweck, 2007). I maintain that equitable and appropriate use of resources within the elementary school impacts the implementation of flexible grouping. Resources, as a social context, are essential to be able to implement flexible grouping properly. Furthermore, data and assessment (Gamoran, 2011), skill and needs based decision-making (Gamoran, 2011; Conner et. al., 2004a, 2004b, 2007, 2009), proper training and collaboration (Castle, Deniz, & Tortora, 2005), and curricular adjustments (Tieso, 2004) are key pieces of successful flexible grouping implementation and success. It is important to recognize that ability grouping and tracking are different from flexible grouping, not only in definition, but also implementation. In recognizing this difference, the research indicates that ability grouping and tracking do not benefit student achievement (Slavin & Karweit, 1985; Slavin, 1987; Slavin, 1993).

2.5.1 Statement of Inquiry Questions.

Using this review of literature, an action research study was conducted within the context of the school setting. Action research was utilized to examine how flexible grouping is impacted by best practices that have been identified in the research. Variables such as culture, climate, perceptions, mindset, and collaboration were examined. Teaching and learning were examined

in the school setting utilizing data available from grades two through five, implementing flexible grouping strategies during mathematics instruction.

Based on the research of my problem of practice, the questions that guided the inquiry study within the work setting were:

1. When utilizing flexible grouping in elementary mathematics, how do teachers and parents perceive the process?
2. Does school culture affect the implementation of flexible grouping in elementary mathematics?
3. Is there evidence that flexible grouping practices positively affect teaching and learning in the elementary grades?

3.0 APPROACH AND METHODS

3.1 APPROACH

An exploration of practice was conducted by examining the context through two theoretical perspectives known as constructivist theory (Brooks & Brooks, 1999) and the theory of learned helplessness (Dweck & Reppucci, 1973). These two frameworks can be used as a guide for beneficial learning and grouping. Teachers and parents can learn how to motivate children in ways that develop a growth mindset. Using Dweck's (2007) and Brooks and Brooks (1999) work as a guide, two key factors to success in the classroom come from the mindset of the student along with providing an environment in which learning is customized to each student. How does flexible grouping, as I analyzed through the lenses of grouping practices, instructional and climate variables, and the context of culture, impact teaching and learning and affect the likelihood for success and achievement in learning?

Iterative designs carry the premise that research is a cyclical process impacting current practice and influencing change. Due to the nature of the research questions and focus of the problem of practice, along with being a participant and a researcher, iterative designs satisfy the needs of the study. Action research was utilized within the school setting to examine how flexible grouping is impacted by best practices that have been identified in the research literature. Using the premise that one purpose for action research involves school leaders and

educators actively involved in reflective practice, a study within my work setting allowed our school to focus on the problem of practice and discover its potential strengths and weaknesses in improving student learning in conjunction with teacher instruction. Variables such as culture, perceptions, mindset, and even collaboration were examined. Teaching and learning in the school setting was examined utilizing data available from grade level teachers implementing the flexible grouping strategy during mathematics instruction. Evidence of what elements teachers used when implementing flexible grouping practices and how teachers felt about flexible grouping was a key process of the data analysis. The results will be used to make decisions on flexible grouping practices and actions regarding teacher instruction and student learning in current and future implementation cycles of flexible grouping.

Currently, I am the school administrator in a building that is implementing flexible grouping for mathematics instruction; therefore, action research was a viable option for this study. I participated in the study as the building Principal, but also the researcher in order to examine the effects on culture and achievement. Stakeholders involved in the study were teachers and parents. Accepting my positionality was crucial to understanding research findings along with recognizing my own biases. It was important to recognize how involvement in the study would impact other stakeholders' participation and also how results were interpreted. Similar to Herr and Anderson (2005), I have "unexamined, tacit knowledge of a site" (p. 35) and therefore would incur "unexamined impressions and assumptions that need to be surfaced and examined" (p. 35).

3.2 METHODS

3.2.1 Approach and Analysis Overview.

A mixed methods approach was conducted. Three different methods were used to investigate the research questions; surveys, focus groups, and document examination. Quantitative analysis was used with the surveys and some document examination. Qualitative analysis was used with focus group data and document examination. Focus groups and surveys provided perceptions and attitudes about each population group along with basic understanding of flexible grouping within the context of the school. Key stakeholders, central to the problem of student grouping, consisted of teachers and parents. One hundred thirty two participants were studied, which included a mix of teachers and parents. These two groups of stakeholders have a share of the responsibility in the successful implementation of flexible grouping. Surveys provided baseline data about stakeholder understanding and perceptions of flexible grouping. Twenty staff members who worked at the research site were surveyed. One hundred parents were also surveyed (randomly choosing 50% of the parents from grades 2-5). Based on survey responses of those willing to participate, focus groups were conducted in order to further study participants' thoughts. A focus group was conducted with three staff from grade three who work at the research site. A focus group was also conducted with three staff from grade four who work at the research site. In addition, a focus group was conducted with four parents of students who were enrolled in the school in grade five.

These two methods provided perceptions and attitudes about each stakeholder group. In addition, within each focus group, it was interesting to observe how teachers influence each other in the group. When asking questions with other teachers present, the school community

perceptions provide information regarding the school culture and also the depth of knowledge regarding the problem of practice.

Document examination was the third method and provided evidence regarding flexible grouping implementation. Documents allowed me to observe the progress of each flexible grouping process and the changes made between each cycle. Document examination was used to gather additional data on the effect on teaching and learning. Documents examined included: teacher lesson plans, team meeting notes and agendas, student grouping documents, mathematics grouping calendars, teacher data analysis, state testing results, and local formative and summative testing results. The documents were analyzed based on coding units. Notes and communications reflected understanding of the implementation process. These documents provided insight on the information used to impact student grouping and further planning. In addition, the documents provided data results on student learning, progress, and growth. The table below aligns each inquiry question with the method used to examine it, along with the evidence process and collection during the study.

Table 1. Inquiry Questions with Method and Evidence Collection

Inquiry Question	Method or Design	Evidence Process and Collection
When utilizing flexible grouping in elementary mathematics, how do teachers and parents perceive the process?	Focus Groups & Surveys	* Conduct focus groups and surveys of teachers and parents * Discover perceived benefits and disadvantages * Is there a clear understanding of flexible grouping across stakeholder groups? * Perceptions and attitudes that might affect implementation of flexible grouping * Teachers: how do they implement flexible grouping, plan for the process * Parents: experiences occurring in the home environment related to this learning process. *Teachers/Parents: Are there key elements required to make flexible grouping successful?
Does school culture affect the implementation of flexible grouping in elementary mathematics?	Focus Groups	*Teachers: how do they implement flexible grouping, plan for the process *Discover perceived benefits and disadvantages when influenced by the community, school, and organizational policy * Discover perceptions and attitudes that might affect implementation of flexible grouping
Is there evidence that flexible grouping practices positively affect teaching and learning in the elementary grades?	Document Examination	* Teacher lesson plans * Team meeting notes and agendas * Student grouping documents * Mathematics grouping calendars * Teacher data analysis * State testing results * Local Formative and Summative testing results

3.3 RESEARCH DESIGN

3.3.1 Teacher Participants.

Research activities, for teacher participants, involved surveys and focus groups designed to provide perceptions and attitudes from teachers along with basic understanding of flexible grouping within the context of the school. Surveys were conducted online using Qualtrics. The survey was emailed to twenty participants and took approximately 10 minutes to complete. The twenty teachers surveyed worked at the research site and had experience using flexible grouping practices (see Appendix A**:** Teacher Survey in Qualtrics on Flexible Grouping in Elementary Mathematics). The surveys were distributed in October 2016. The surveys provided baseline data about teacher perceptions and understanding of flexible grouping implementation. Based on a final question in the survey that asked participants to express interest in a focus group, participants filled out a Google form with contact information (see Appendix C**:** Google Forms for Focus Group Participant Contact Information). The focus groups were used in order to create an environment in which the conversation was relaxed. A focus group was conducted with three teachers from grade three. A focus group was also conducted with three teachers from grade four. Focus group sessions took place at the research site, for scheduling and convenience. Focus group sessions were held in a private school conference room with privacy tape covering the windows. The focus group sessions were expected to last thirty minutes, using five questions. (see Appendix D**:** Teacher Focus Group Protocol). Focus groups were audio recorded. They were then re-recorded using an app called “Dragon Dictation”. Transcription from the audio recording was completed and cross-referenced with the text recorded on Dragon Dictation. Dragon Dictation scripts verbal information into written form.

3.3.2 Parent Participants.

Research activities for parent participants involved surveys and focus groups. These activities provided perceptions and attitudes from parents, along with basic understanding of flexible grouping, within the context of the school. Exploration of the experiences parents had with flexible grouping within the home environment was a focus. Surveys were conducted online using Qualtrics. The survey was emailed and took fewer than ten minutes to complete (see Appendix B**:** Parent Survey in Qualtrics on Flexible Grouping in Elementary Mathematics). One hundred parents were surveyed from the research site (by randomly choosing 50% of the entire parent list from grades 2-5, whose children were currently experiencing flexible grouping in mathematics). The surveys were distributed in October 2016. The surveys provided baseline data about parent perceptions and understanding of flexible grouping implementation, practices, and student reactions. Based on a final question asking willing participants to express interest in a focus group, participants filled out a Google form with contact information (see Appendix C**:** Google Forms for Focus Group Participant Contact Information). A focus group session was conducted with four parents of students who were enrolled in the research site in grade five. The focus group session took place at the research site for ease of scheduling and comfort of location. The focus group session was conducted in a private school conference room with privacy tape covering the windows. Focus group sessions were expected to last thirty minutes, using four questions (see Appendix E**:** Parent Focus Group Protocol). The focus group was audio recorded using a recording device. It was then re-recorded using an app called “Dragon Dictation”. Transcription from the audio recording was completed and cross-referenced with the text recorded on Dragon Dictation.

3.3.3 Document Examination.

Document examination provided evidence regarding flexible grouping implementation. Documents provided a way to analyze the progress of the flexible grouping process and changes made between cycles. Document examination was used to gather additional data on the effect of flexible grouping methods on teaching and learning. All of the collected documents were available through regular administrative channels and did not require permission to access. Some were readily available to the public; such as teacher lesson plans, which are required to be posted on the school's websites. The state and local formative and summative testing results was aggregated data by grade level. The test results were not delineated (by student) and no individual level data was identifiable or used. State data applicable to this study was available for grades 3, 4 and 5. Formative and summative data conducted by the school and district was available for grades 1, 2, 3, 4, and 5.

3.4 ANALYSIS AND INTERPRETATION

3.4.1 Quantitative and Qualitative Analysis.

Basic quantitative statistical analysis was used for the surveys. Basic quantitative data analysis involved frequency distributions, descriptive statistics, and data disaggregation. Software supporting analysis was done using Qualtrics and Excel.

Qualitative research was used for the focus groups. Two separate focus groups with staff from the research site staff participated in a session. Three staff from grade three and three staff

from grade four met separately to discuss flexible grouping. Additionally, a focus group with four parents of students that were currently enrolled in the school in grade five provided further data. The parents and staff were volunteers who were selected based on their willingness to participate in the focus group activity. From the recorded focus group sessions, data analysis using coding and recoding occurred to search for themes and address transferability. Data was triangulated in order to examine reliability. Focus group sessions were transcribed and then analyzed using coding notes and Excel.

Finally, document analysis was completed using coding to look for themes and evidence with the documents. The table below summarizes the relationship between the inquiry question, its matching method(s), and how the data was then analyzed and interpreted.

Table 2. Inquiry Questions with Method and Analysis/Interpretation

Inquiry Question	Method or Design	Analysis and Interpretation
When utilizing flexible grouping in elementary mathematics, how do teachers and parents perceive the process?	Focus Groups & Surveys	* Survey using Qualtrics of 20 staff, 100 parents * Response interest for focus group using Google Forms * Survey results will be analyzed using basic quantitative statistical analysis using Qualtrics and Excel. Frequency distributions, descriptive statistics, and disaggregate the data * Focus groups with 3-4 teachers / parents * Coding and recoding to search for themes and address transferability. Triangulate the data in order to examine reliability. * Transcribing the focus groups and using coding notes and Excel for analysis.
Does school culture affect the implementation of flexible grouping in elementary mathematics?	Focus Groups	* Focus groups with 3-4 teachers / parents * Coding and recoding to search for themes and address transferability. Triangulate the data in order to examine reliability. * Transcribing the focus groups and use coding notes and Excel for analysis.
Is there evidence that flexible grouping practices positively affect teaching and learning in the elementary grades?	Document Examination	* Documents will be analyzed based on coding units (to be determined) * Notes and communications will reflect understanding of the implementation process * Documents will provide insight on the information used to impact student grouping and further planning. *Documents will provide data results on student learning.

The inquiry questions were used to examine the factors of perceptions, culture, and teaching and learning within the implementation of flexible grouping. This study described the details of one iterative cycle of the process. The results will be used to make decisions on flexible grouping practices and actions regarding teacher instruction and student learning in current and future implementation cycles of flexible grouping.

3.4.2 Analysis and Interpretation of Results.

Analysis and interpretation of the results connected the findings to the literature on grouping practices as well as provided understandings within the context of the problem area. For the focus groups, session recordings were completed using both an audio device recording and also an app called Dragon Dictation. Transcription of the notes was completed and coded using notes and an Excel spreadsheet. Evidence of the elements teachers used when implementing flexible grouping practices and what teachers believed about flexible grouping was a main focus. Additional evidence came from the documents collected. The results from all three methods suggest how the staff reacts and acts in order to improve their teaching and student learning. As Herr and Anderson (2005) mention, I want "to use [the research] to empower…professionally and personally and to bring about organizational change" (p. 29).

4.0 FINDINGS

The purpose of this study was to uncover understandings, benefits, and disadvantages to implementing flexible grouping practices in elementary school mathematics instruction. The study uncovered the value, benefits, disadvantages, key elements, and beliefs regarding the implementation of flexible grouping within the research site. This chapter will summarize the results of the teacher and parent surveys, the three focus groups, and an examination of documents. Both quantitative and qualitative analysis was used to examine the results across the surveys, focus groups, and documents. The examination of the results allows for discussion on the three inquiry questions. The inquiry questions were used to examine the factors of perceptions, culture, collaboration, and teaching and learning in the implementation of flexible grouping. The results reveal common survey responses and the most frequently coded focus group responses. The findings help to determine the impact of flexible grouping practices and what future actions may be needed to improve teacher instruction and student learning.

4.1 SUMMARY OF SURVEY FINDINGS BY INQUIRY QUESTION

To provide the reader with a better understanding of the findings, a summary of each inquiry question addressed in the surveys is described below. Basic quantitative data analysis involved descriptive statistics, such as: totals, averages, percent responses, frequency

distributions, and data disaggregation. Following the quantitative analysis of both teacher and parent survey results, interpretive findings are then reported.

4.1.1 When utilizing flexible grouping in elementary mathematics, how do teachers perceive the process?

In order to examine how teachers perceive the process, participants were asked questions about their overall opinion on the implementation of flexible grouping in the school. Every teacher who participates in mathematics instruction (20 total) was surveyed and all twenty responded to the survey. Teachers were asked if they understood the definition of flexible grouping, how often they believed they utilized flexible grouping during mathematics, their opinions on the success of flexible grouping, and also they provided key elements they believed impact the implementation of flexible grouping. Of the twenty teachers surveyed, sixteen were grade level teachers ranging from Kindergarten to Fifth grade and four were support staff, including a reading specialist, a learning support teacher, and two classroom support teachers. Teachers ranged in experience from a minimum of two years to a maximum of twenty-four years in the classroom. The mean teaching experience was 12.2 years.

All twenty teachers responded that they understood the definition of flexible grouping. Of the twenty teachers, 90% (18 of the 20) responded that they engage in flexible grouping daily. Of the two participants who did not respond as engaging in flexible grouping daily, one responded as never using flexible grouping and the other responded as ‘other’ stating that, “I used it daily when I taught in the upper grades”.

Using the research of Dweck and Repuccci (1973), Diener and Dweck (1978), Dweck (1986), along with Tice (1997), participants were asked to provide their opinion on two factors

that play a role on the implementation of flexible grouping. The theory of learned helplessness and theories regarding school culture can both impact the success of flexible grouping practices within a school. Keeping these factors in mind, teachers were asked to determine how flexible grouping impacted specific elements of learning. These results are summarized in the table below.

Table 3. How Teachers View the Implementation of Flexible Grouping and How It Affects Elements of Teaching and Learning

Question	Positively Affects		Somewhat Affects		Neither Affects Nor Prevents	
The learning of all students	100.00%	20	0.00%	0	0.00%	0
The learning of students above grade level standards	100.00%	20	0.00%	0	0.00%	0
The learning of students on grade level standards	95.00%	19	5.00%	1	0.00%	0
The learning of students below grade level standards	95.00%	19	5.00%	1	0.00%	0
My instruction	90.00%	18	10.00%	2	0.00%	0
My lesson design	75.00%	15	25.00%	5	0.00%	0
My collaboration with colleagues	90.00%	18	5.00%	1	5.00%	1
My use of data analysis	95.00%	19	5.00%	1	0.00%	0
My use of instructional time	90.00%	18	10.00%	2	0.00%	0
Grade level assessment results	95.00%	19	5.00%	1	0.00%	0

In this question, three other options were given to the teachers to choose from, these were: ‘Somewhat Prevents’, ‘Greatly Prevents’, and ‘Unsure’. None of those options were selected, and therefore, they were not included in Table 3. Key findings show that the majority of teachers believe that teaching and learning principles are positively affected by the implementation of flexible grouping. This includes both teacher instruction and student learning, along with the principles of instruction, such as data analysis, time, lesson design, and collaboration.

Using the information on grouping practices stated within the literature review, Slavin (1985, 1987, 1993), Slavin and Karweit (1985), Castle, Deniz, and Tortora (2005), Gamoran (2011), Tieso (2004), and Conner et al. (2004a, 2004b, 2007, 2009), all provide research on common elements that appear within flexible grouping practices. Thus, the final question of the survey asked the teachers to select 'four flexible grouping practices that appear in the literature that you believe to most likely result in an improvement in teaching and learning'. These selections are shown in the bar graph in Figure 1.

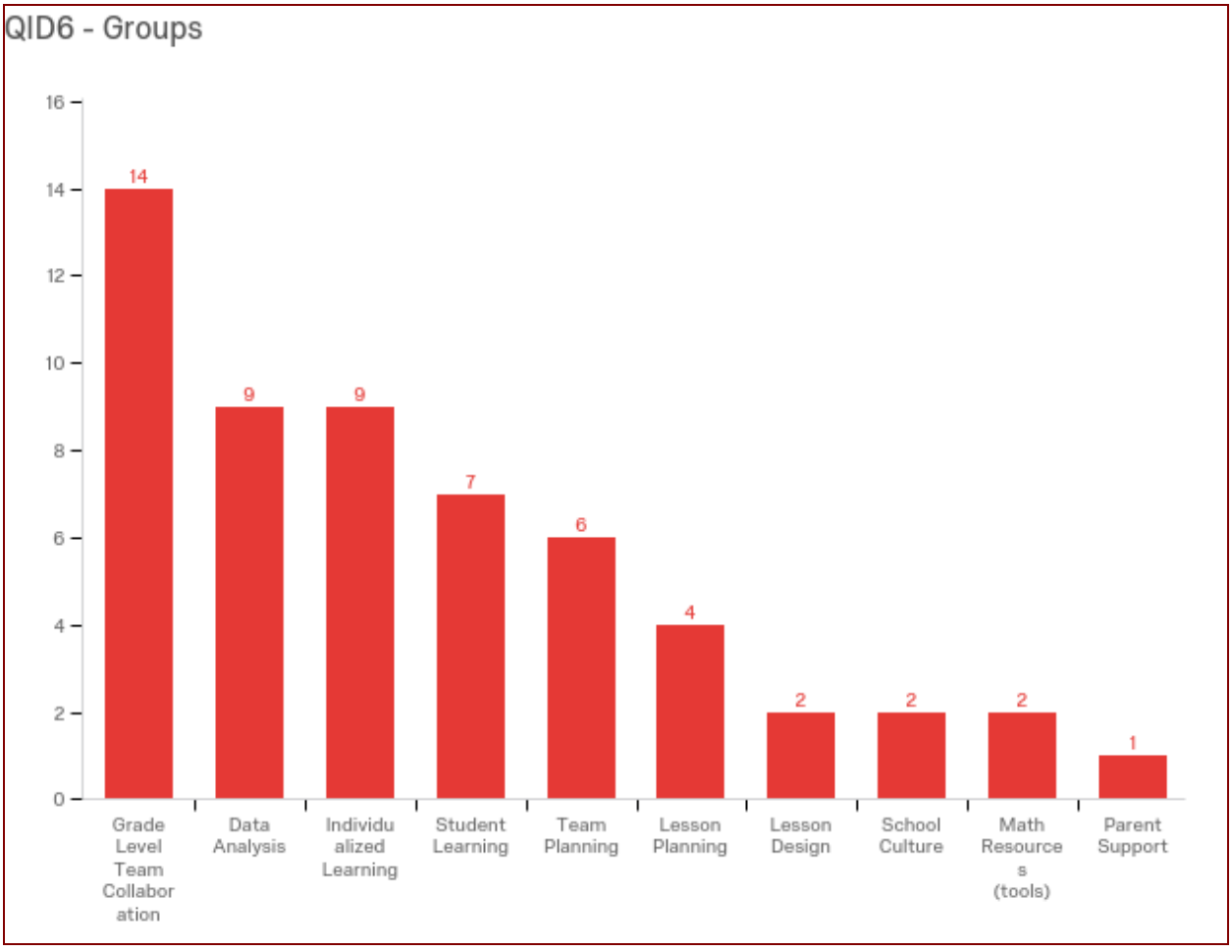


Figure 1. Most Important Flexible Grouping Practices for Improvement in Teaching and Learning

These findings show that according to the teacher participants, grade level collaboration is the most important element of improvement in teaching and learning when implementing flexible grouping practices. Fourteen out of twenty teachers (70%) included this element as one of their top four choices. The next two highly considered elements in flexible grouping implementation to impact teaching and learning were data analysis and individualized learning, both receiving nine votes from the twenty teachers (45%). Student learning and team planning were also selected as two additional elements having a greater impact on the improvement of teaching and learning. According to the teachers, parental support, lesson design, school culture, and math resources were not chosen as the top four most important elements that potentially impact teaching and learning.

4.1.2 When utilizing flexible grouping in elementary mathematics, how do parents perceive the process?

In order to examine how parents perceive the process, parent participants were asked questions about their overall opinion on the implementation of flexible grouping in the research site. One hundred parents having children in grades two through five were surveyed. 55% of the parents fully completed the survey. Parents were asked if they felt they understood the definition of flexible grouping, how often their child spoke about mathematics at home, and their opinions on the success of its impact. Parents of students in all four grades participated and seven parents had children in two of the grade levels surveyed, providing them with two different perspectives. Parents ranged in years spent attending the research site from a minimum of one year to a

maximum of six years (K-5). The mean amount of time children attended the school was 4.31 years.

78.13% of the fifty-five parents responded that they understood the definition of flexible grouping. 9.38% of parents said that they did not understand the definition of flexible grouping and 12.5% responded that they were unsure. 56.25% of parents responded that their child speaks about mathematics class at home daily. 28.13% of the parents stated that their child speaks about mathematics at home weekly. Sporadic mathematics conversation at home was selected by 7.81% of the participants and 4.69% said that mathematics is never discussed at home.

Similar to the teachers, using the research of Dweck and Repuccci (1973), Diener and Dweck (1978), Dweck (1986), along with Tice (1997), participants were asked to provide their opinion on two factors that believe play a role on the implementation of flexible grouping. The theory of learned helplessness and theories regarding school culture can both impact the success of flexible grouping practices within a school. Parents were asked to determine how flexible grouping impacted specific elements of learning. These results are summarized in Table 4 below.

Table 4. How Parents View the Implementation of Flexible Grouping and How it Affects Elements of Teaching and Learning

Field	Positively Affects	Somewhat Affects	Neither Affects Nor Prevents	Somewhat Prevents	Greatly Prevents	Unsure	Total
The learning of my child	70.91% 39	21.82% 12	1.82% 1	3.64% 2	0.00% 0	1.82% 1	55
The needs of my child in mathematics	67.27% 37	25.45% 14	1.82% 1	3.64% 2	0.00% 0	1.82% 1	55
My child's experience in class	67.27% 37	23.64% 13	5.45% 3	3.64% 2	0.00% 0	0.00% 0	55
My child's view of mathematics class	60.00% 33	21.82% 12	12.73% 7	5.45% 3	0.00% 0	0.00% 0	55
How my child speaks about mathematics	45.45% 25	25.45% 14	21.82% 12	1.82% 1	0.00% 0	5.45% 3	55
The learning of all children	45.45% 25	23.64% 13	1.82% 1	1.82% 1	0.00% 0	27.27% 15	55
The learning of some children	41.82% 23	29.09% 16	3.64% 2	3.64% 2	3.64% 2	18.18% 10	55

As Table 4 indicates, key findings were that the majority of parents felt that the implementation of flexible grouping positively affected the learning of their child, the needs of their child, and their child's experience in mathematics class. Each teaching and learning element listed in the table received three or fewer parents (4%) who believed that the implementation of flexible grouping would be 'somewhat preventing' or 'greatly preventing'.

4.2 INTERPRETIVE FINDINGS OF SURVEY RESULTS

The findings provide support for the value and benefits of flexible grouping practices in mathematics. They suggest that both teachers and parents believe they not only understand

flexible grouping, but also indicate that flexible grouping has an overall positive impact on the teaching and learning in the classroom. The majority of teachers report engaging daily in the practice of implementing flexible grouping and the majority of parents expressed that their children speak about mathematics at home.

With respect to the elements of learning that are impacted by flexible grouping implementation, a majority of both teachers and parents responded that student learning is positively influenced. Teachers also responded that instructional elements such as collaboration, data analysis, instruction, lesson design, assessment results, and use of instructional time are positively affected by flexible grouping implementation. When forced to select the four most important elements for successful flexible grouping implementation, teachers choose grade level collaboration as number one. This indicated that teachers believed grade level collaboration positively impacted instruction. Teachers also affirmed that the school or grade level's teaching and learning is positively impacted if they use data analysis, focus on individualized learning, and collaborate in planning. Overall, it can be interpreted that both parents and teachers have positive views of flexible grouping on teaching and learning and perceive the process as worthwhile.

4.3 SUMMARY OF FOCUS GROUP FINDINGS BY INQUIRY QUESTION

To provide an understanding of the focus group findings, a summary of each inquiry question addressed is described. Focus group sessions were transcribed and then analyzed by coding and recoding. Highlighting words or phrases that repeated throughout all focus group transcriptions generated coding notes. The notes were reviewed multiple times. Data analysis

using coding notes was used to search for themes and address transferability. The data from the focus group sessions was triangulated, by analyzing the transcription results repeatedly, to find the themes that occurred across all responses. Eight themes were identified from the three focus group transcription notes and are shown below in Table 5.

Table 5. Flexible Grouping Themes Across All Focus Groups

Impact on Teaching and Learning	Standards-Based Decisions	Positive Opinions
Communication, Collaboration, and Culture	Experiences Related to Understanding	Constantly Changing Process
Use of Assessment	Student Impact	

These themes helped to categorize specific comments made by the focus group participants. Within each of these themes, key implementation elements were mentioned by both participant groups and are described in the findings of this study. The implementation elements were named by the participants to be essential for successful implementation. Additionally, more specific details are described within the analysis to provide guidance as to how flexible grouping is perceived, how culture affects implementation, and how flexible grouping impacts teaching and learning. Following the qualitative analysis of teacher and parent focus group results, interpretive findings are discussed across all inquiry questions.

4.3.1 When utilizing flexible grouping in elementary mathematics, how do teachers and parents perceive the process?

Using a coded theme of ‘experiences related to understanding’, both parents and teachers expressed views on their perception of the process. The findings show that both parents and

teachers formed opinions and perceptions on the process of flexible grouping that were easily discussed in the focus group sessions. Very few probing questions were needed, as comments were readily provided. It can be interpreted that both participant groups felt knowledgeable enough to share their thoughts on the process. Some comments occurred across both participant levels when asked about their experiences with flexible grouping and also how they would explain flexible grouping to another parent or teacher. For example, both teachers and parents mentioned what they perceived as important elements within the implementation of flexible grouping. These comments included: “appropriate grouping”, “grouping by skill”, “grouping by strength or weakness”, “being taught at a good rate or pace”, and “using the appropriate learning level” for each student. Parent 2 stated, “It [flexible grouping] is there to make sure they are in the appropriate group for each lesson that they’re at and so it changes without the parents seeing anything”. Parent 3 mentioned, “It [mathematics] is still being taught at a rate that he can understand what’s going on”. Parent 1 responded with a definition that included, “To flexible group the students would be to group by areas of strength or areas of weakness. It just depends on what assessment is producing the outcome”. Teachers shared similar experiences and perceptions. Teacher 1 stated, “We are able to focus on a specific group of students and their current needs at that time. ...Each group is able to work at their own pace and the ability level in which they’re currently at”. Teacher 2 mentioned, “They [students] can go in and out of groups based on what they understand for each standard”. Several teachers mentioned the importance of students not getting “overlooked” and also that students go into groups where their needs are being met and on their “learning level”. In one of the teacher focus groups, teacher 3 wanted to summarize the main importance of flexible grouping. “The key to, it sounds corny, but the key to flexible grouping is the flexibility to move within the instruction”.

'Positive opinions' appeared as another theme implying that the process of flexible grouping for mathematics is a positive experience for both teachers and students. Both participant groups mentioned specific evidence to express their positive opinion about flexible grouping. Parents spoke on behalf of their children and what they perceived was occurring in terms of their child's experience. Comments such as "happier in school", "the benefits outweigh the downfalls", and "nothing unbeneficial" were all made by the parents. Teachers responded in a way that explained why they would advocate for the use of flexible grouping and their opinion on its success. Comments such as "I have seen the benefits", "I don't think I could teach without it", "I believe it is right", and "I believe it is working" were mentioned in the two teacher focus groups. Teacher 1 felt strongly enough to speak up at the end of the focus group session to add an unsolicited comment.

> "I'm just a huge proponent now of flexible grouping because I feel like I have seen the benefits of flexible grouping and what it has done for our students and how it makes them feel confident and successful in different situations and the ability to extend their learning and I just feel like it meets all of the students where they need to be met."

Both parents and teachers had two negative opinions that were shared in each focus group. The higher the number of students in each classroom after students were grouped, based on pre-test results, appears to negatively impact satisfaction and opinion of the process. Both parents and teachers also stated when there are less group options for students to be split into, they believed this to be another negative opinion regarding their experiences. More specifically, the more teachers that are available to split up the groups and make the class sizes smaller, the happier parents and teachers feel about the grouping. It was noted that both parents and teachers realize this is impacted by available resources (staffing) in the building, but prefer more group options with smaller sizes. Resources, specifically size and number of groups, could be implied as another key element for successful implementation of flexible grouping.

The findings also showed that another theme centered on how flexible grouping is a 'constantly changing process'. This terminology was mainly used from teachers in the focus group setting, but one parent (2) did comment on how the process of flexible grouping is "a constantly changing process". Teachers were more specific in what they meant by terming the process as changing. Words such as "fluidity", "frequent", "constant", "movement", and "switching" were mentioned from various teachers to describe how the process changes. Teachers in the focus groups tried to describe how students move from one teacher to another frequently in order to meet their learning needs based on a skill or standard. Teacher 1 mentioned,

> "We're constantly evaluating. Do these students need to be in this group? Could they be switched to a different group? Are they understanding this concept? So, they're not stuck in a group once they're in that group. We're constantly changing them based on what we see in their performance on that topic."

A fourth theme helps to understand how flexible grouping in mathematics is perceived is that of making 'standards-based decisions'. This theme was mentioned in both the parent and teacher focus groups. Core Academic Standards are requirements for public schools within the state and teachers and parents mentioned this as an important component of the flexible grouping process. Parent 2 realized these decisions by teachers when mentioning that teachers were changing groups on a "weekly basis" and decisions might even be made "3 days to 5 days depending on what the topic is". Teachers spoke about the use of standards as the main way that they decide how to group the students and standards are what they follow for instructional purposes. Teacher 2 commented, "We do this every unit. We switch sometimes per standard". Teachers also referred to standards as a method to decide how long to teach in certain groups based on its level of difficulty or timeline. Teacher 5 stated, "It [grouping] varies from time to time. It depends on the standards. We might...take a whole week for one standard. Other times

it might be one or two days". Teachers also described the importance of district developed curricular timelines and standard documents that help to support the planning and instruction for mathematics class and also the flexible groups. Additionally, based on the findings, the concept of standards also appears to impact how teachers understand other grade level expectations. Teacher 6 mentioned, "we compare our different topics...with grade level to grade level about certain standards".

Another theme, the 'use of assessment', was found in the focus group coding. Parents and teachers both have perceptions and beliefs on the use of assessment in relation to how it is incorporated into mathematics flexible grouping. Assessments were mentioned when referring to how grouping is managed and organized and also how they promote certain processes within the instruction and planning for the teachers. Words and phrases such as: "pre-tests", "post-tests", "data analysis", "before each unit", and "assessments impact outcomes" were mentioned by various parents and teachers during the conversations. Teacher 3 specifically referred to assessments as data that will "guide our instruction". Teacher 6 mentioned the importance of showing the students their assessment results. "We have the post-test and the pre-test and we show them to each child individually". The teachers' discussed the importance of assessments goes beyond just grouping, and instead includes a way to identify growth or continued areas of weakness. Teachers also mentioned that without the assessments or use of data analysis, it would be "impossible" to group the students. Both teacher focus groups described in detail what they meant by using assessments and data to group students for instruction and learning. Teachers in both grade levels spoke of similar methods. The teachers use "four or five questions per standard" on the pre-tests and teachers and groups are determined based on each child's results. Teacher 5 clarified by stating, "If a child gets all four questions right, they might go into

a project group and if they miss one, they may go in the high-level group" and so on. The teachers mentioned that the district has developed pre-tests that the students are administered and Teacher 3 clarified with,

> "We have a guideline set up by the district that aligns to a set of standards that we follow that are tested from the state...and each of those sets of standards is divided into units. The units are then divided into lessons and the district has developed pre-tests for us that we use to have the students complete the pretest ahead of time and then we meet to go over the results together".

Teachers stated that when students earned good results on a pre-test, this typically indicated that students "probably have a pretty good understanding" of the skills. Teachers continued by explaining that students showing an understanding of skills should work to apply the concept within a project setting. Students who earn a low score on the pre-test likely need to be taught at a "slower pace", in a "smaller group", and with "differentiated" teaching. All of the comments and perceptions within the findings regarding assessment implied that the use of assessment and data analysis is a necessary element of flexible grouping implementation in order to implement it in a meaningful way.

4.3.2 Does school culture affect the implementation of flexible grouping in elementary mathematics?

Two main themes emerged from the coding that pertained to school culture and the implementation of flexible grouping. One theme emerged as a blend of the terms, 'communication, collaboration, and culture' and the other theme suggested 'student impact'. These two themes, when analyzed, were interpreted as themes that the school environment or school culture can impact in order to have the effect that is mentioned by both parents and teachers.

Starting with the communication, collaboration, and culture within the building, the findings suggest the kind of environment and relationship that exists within the building (among staff and students) in order to promote and allow the implementation of flexible grouping to be successful. Both parents and teachers commented on the culture within the building. Parents mentioned that flexible grouping happens "behind the scenes" and "students are not affected by who is in what group". Parents were referring to how creating and assigning flexible groups happens seamlessly and is a normal part of the student day. Parents also commented on how their child was "not affected by the movement" and that the parents and students "don't see it [the act of grouping and regrouping]" happening on a daily basis. Parents clarified that this was due to the way the grouping process is embedded in what teachers do and how students smoothly go from one group to another for mathematics. The students appear to know that is how mathematics works and move from one teacher to another based on what they need to learn next. In the teacher focus groups, teachers shared their responses regarding school culture and relationships with colleagues using phrases such as "work as a team", "share ideas", willing to "adapt and change", "creates and pushes conversations", "care about each other and the [data] results", and that the teachers need to talk and meet "everyday".

Teachers were able to describe the elements required for this type of culture and collaboration, but also to effect teaching and learning. When discussing this topic, several key elements for implementation surfaced. As described below, these elements were: collaboration, common time, teamwork, time management, and respect. For example, Teacher 2 stated that, "we couldn't do flexible grouping without a common time". Several teachers mention the concept of common planning time in their statements. Common planning time was described as time set aside for teachers to meet, analyze data, and plan instruction. Another important feature

was what Teacher 4 described as “a solid good team and good communication between”. Teacher 3 finished this statement by adding, “We talk every day”. Frequent conversations and strong relationships among teachers appear to be essential elements for successful implementation of flexible grouping. One could infer from the statements the teachers made that the culture in the building promotes healthy relationships and an effective use of time. When probed more about the culture within the building, the teachers spoke about how flexible grouping creates more conversations in the building and encourages relationship building. “I think it depends on the people too”, Teacher 4 mentioned, implying the importance of having teachers believe in the process and also want to be invested in it. Teacher 6 stated, “I think everyone here is onboard with flexible grouping”. Teachers also agreed that the use of flexible grouping increased conversation across grade levels because of “constantly striving for data and all these goals”. Teacher 1 also spoke on behalf of the culture in the building stating, “I feel like we’re constantly going from grade level to grade level to see how maybe they did something and we just bounce ideas off of each other all the time and I think that’s what helps this program be successful”. Teachers mentioned the element of teacher ‘buy-in’ and ‘support’ from the parents and administration as important.

In addition, the focus group analysis identified ‘student impact’ as another theme correlating with the inquiry question about school culture. Parents and teachers discussed culture within the building to be one in which students felt comfortable, engaged, and happy. Parent 4 mentioned, “The grouping has helped [the child] be more satisfied with school”. Parent 3 said, “I think more challenged and um, less frustrated” when speaking of the child. Students were mentioned to be “self-driven” with flexible grouping. This parent (2) also stated, “They [children] look at themselves and say, ‘where am I at’ and make sure they understand”. Teachers

had similar thoughts and opinions about student impact. Teachers noticed that students were more comfortable in class and more willing to participate. Teachers believed that students appear to have more "confidence", "motivation", and "engagement". Teachers also noticed that there was fewer negative "behaviors" and attributed this to better engagement on the part of the students. These findings suggest that flexible grouping implementation has a role in the culture of the building and in student motivation.

4.4 INTERPRETIVE FINDINGS OF FOCUS GROUP RESULTS

The results of this study provide support for the value and benefits of flexible grouping practices in mathematics. The findings suggest that teachers and parents believe they understand flexible grouping and that flexible grouping has a positive impact on teaching and learning in the classroom. Both participant groups also indicated that school culture does impact the success of the flexible grouping process. Brooks and Brooks (1999) contribute to the learning analysis of Dweck (2007) in that our educational priorities should shift from teaching children concepts, to teaching children by how they are motivated to learn. Emergent themes show that both parents and teachers believe that flexible grouping has a relationship with school culture and improved teaching and learning. Using Dweck's (2007) and Brooks and Brooks (1999) research, two factors to success in the classroom result from the mindset of the students and an environment in which learning is customized for each student. This study suggests that flexible grouping allows for students to be placed in an environment in which they are able to effectively learn when mindset and environment are intended to maximize potential.

With respect to how flexible grouping impacts teaching and learning, both participant groups expressed that students are learning and growing and they are receiving a "better education". Teachers also commented that the methodology causes them to understand the curriculum, to be flexible with instruction, and to focus on student learning. These results are similar to a study completed by Castle, Deniz, and Tortora (2005) that showed teachers noted improvements in student confidence, focused instruction, and ability to keep student attention due to flexible grouping practices. Teachers, from the Castle, Deniz, and Tortora (2005) study, also claimed instruction was need based.

Gamoran's (2011) work addresses important elements that must be present for flexible grouping to be beneficial. Similar to Gamoran's (2011) work, two key elements mentioned in this current study for implementation were data analysis and assessment. Other key elements brought to the forefront of importance for implementation were: collaboration, common planning time, teamwork, resources, support, time management, and buy-in. Overall, the findings of this study may be interpreted to imply that both parents and teachers have positive beliefs about the implementation of flexible grouping in mathematics. The findings further indicate that flexible grouping has a positive influence on teaching and learning and is related to school culture.

4.5 SUMMARY OF FINDINGS WITH DOCUMENT COLLECTION

4.5.1 Is there evidence that flexible grouping practices positively affect teaching and learning in the elementary grades?

In order to analyze and interpret the final inquiry question, documents were used to determine how teaching and learning are affected by flexible grouping implementation in mathematics. Documents were collected in no particular order. All documents were examined for evidence of potential impact from flexible grouping methodology.

4.5.1.1 Teacher Lesson Plans.

Using document evidence, flexible grouping in mathematics appears to impact teacher lesson planning. Using pre-test data, teachers select students to be placed in flexible groups for learning and plan lessons according to the needs of each group. Some grade levels have lesson plans that indicate students will be moving at their own pace. Other grade level lesson plans indicate that students will be with various teachers. Lesson plans can reflect multiple teachers who are involved with the instruction of each math lesson. Lesson plans also reflect project based learning and alternative activities for mathematics class. Lesson plans show lesson design involving authentic activities and standards-based instruction. The examples shown below are samples of teacher lesson plans.

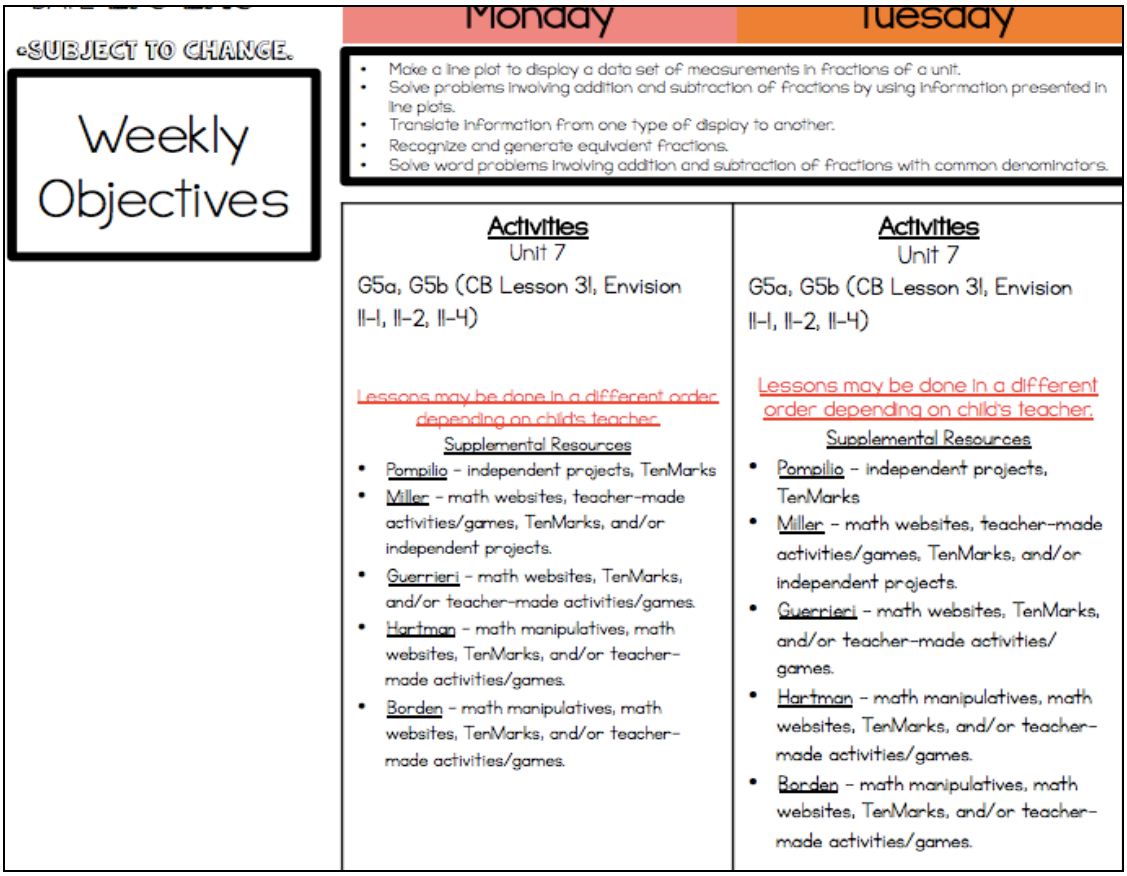


Figure 2. Sample Fourth Grade Teacher Lesson Plan Document

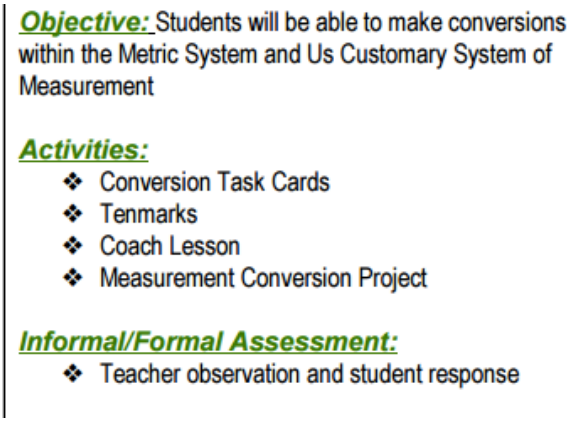
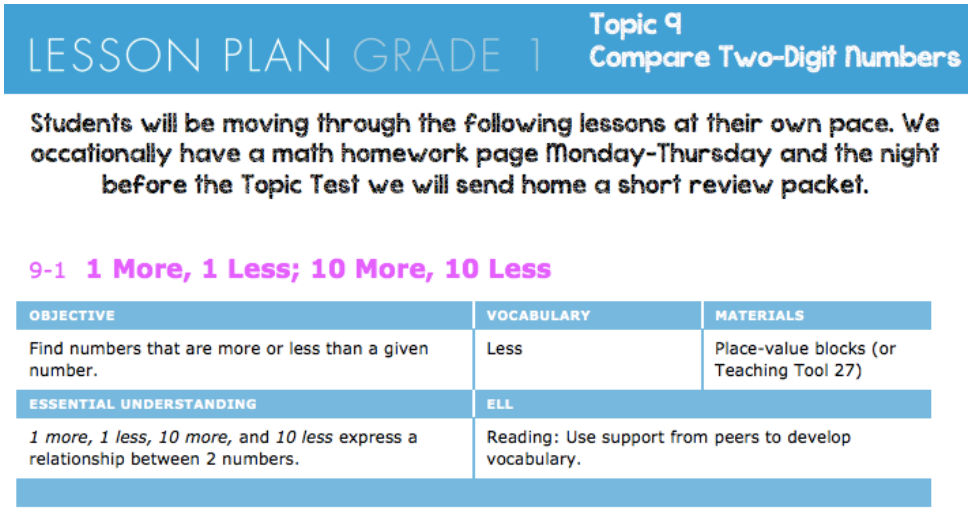


Figure 3. Sample Third Grade Teacher Lesson Plan Document



LESSON PLAN GRADE 1

Topic 9
Compare Two-Digit Numbers

Students will be moving through the following lessons at their own pace. We occationally have a math homework page Monday-Thursday and the night before the Topic Test we will send home a short review packet.

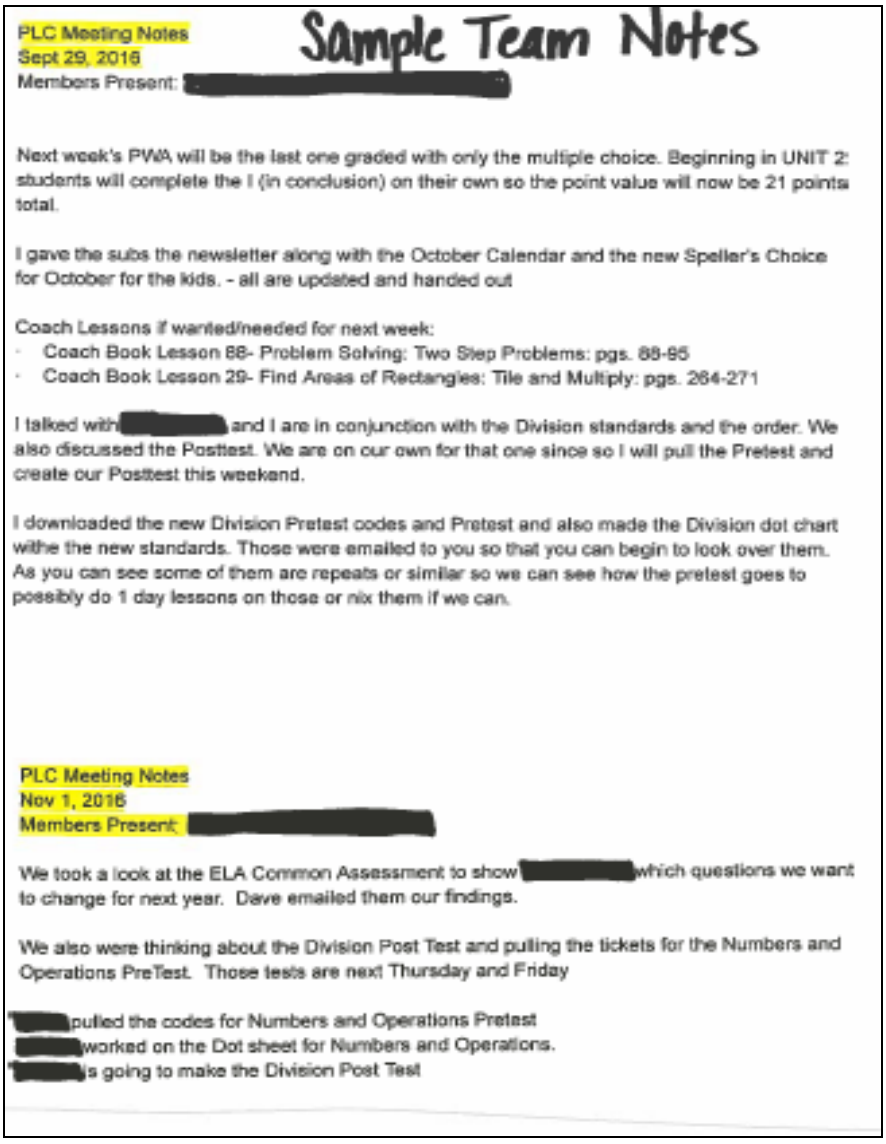
9-1 1 More, 1 Less; 10 More, 10 Less

OBJECTIVE	VOCABULARY	MATERIALS
Find numbers that are more or less than a given number.	Less	Place-value blocks (or Teaching Tool 27)
ESSENTIAL UNDERSTANDING	**ELL**	
1 more, 1 less, 10 more, and *10 less* express a relationship between 2 numbers.	Reading: Use support from peers to develop vocabulary.	

Figure 4. Sample First Grade Teacher Lesson Plan Document

4.5.1.2 Collaborative Team Meeting Notes.

Other documents show that teachers must collaborate to plan lessons according to which skills and standards need to be taught or eliminated based on pre-test results. This is often notated in their collaborative team meeting notes that are taken during each team-planning meeting. An example is shown below.



PLC Meeting Notes
Sept 29, 2016
Members Present: [redacted]

Sample Team Notes

Next week's PWA will be the last one graded with only the multiple choice. Beginning in UNIT 2: students will complete the I (in conclusion) on their own so the point value will now be 21 points total.

I gave the subs the newsletter along with the October Calendar and the new Speller's Choice for October for the kids. - all are updated and handed out

Coach Lessons if wanted/needed for next week:
- Coach Book Lesson 88- Problem Solving: Two Step Problems: pgs. 88-95
- Coach Book Lesson 29- Find Areas of Rectangles: Tile and Multiply: pgs. 264-271

I talked with [redacted] and I are in conjunction with the Division standards and the order. We also discussed the Posttest. We are on our own for that one since so I will pull the Pretest and create our Posttest this weekend.

I downloaded the new Division Pretest codes and Pretest and also made the Division dot chart withe the new standards. Those were emailed to you so that you can begin to look over them. As you can see some of them are repeats or similar so we can see how the pretest goes to possibly do 1 day lessons on those or nix them if we can.

PLC Meeting Notes
Nov 1, 2016
Members Present: [redacted]

We took a look at the ELA Common Assessment to show [redacted] which questions we want to change for next year. Dave emailed them our findings.

We also were thinking about the Division Post Test and pulling the tickets for the Numbers and Operations PreTest. Those tests are next Thursday and Friday

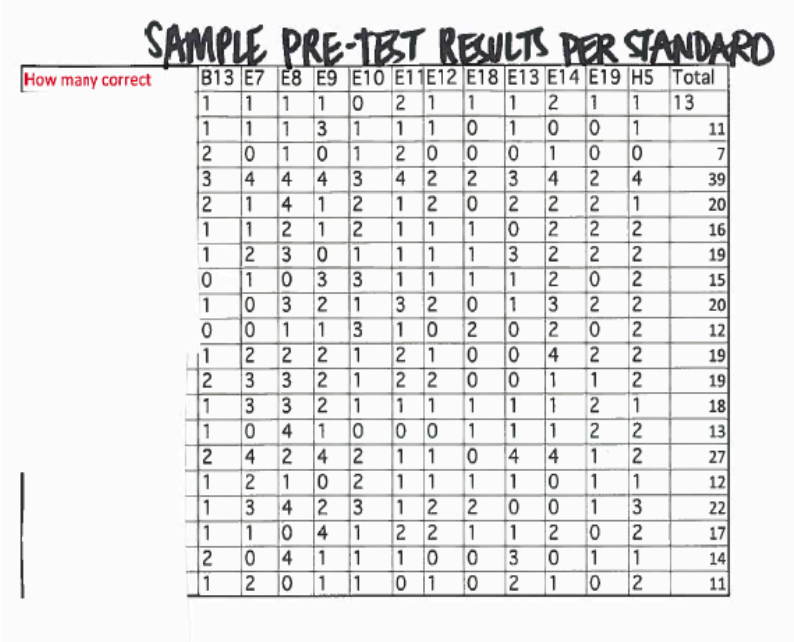
[redacted] pulled the codes for Numbers and Operations Pretest
[redacted] worked on the Dot sheet for Numbers and Operations.
[redacted] is going to make the Division Post Test

Figure 5. Teacher Team Meeting Notes Document

Teachers keep notes on decisions made during meetings, actions to be addressed, and topics that need discussed in order to adequately plan for mathematics lessons. These team-meeting notes indicate that common planning time is used to collaborate with colleagues using data, standards, and lesson plans. Teachers have meaningful discussions that impact teacher instruction.

4.5.1.3 Teacher Data Analysis and Planning Charts.

Additional document evidence indicated that collaboration and planning is also reflected in data analysis charts and grade level analysis that teachers use to impact individual student learning decisions.



SAMPLE PRE-TEST RESULTS PER STANDARD

How many correct	B13	E7	E8	E9	E10	E11	E12	E18	E13	E14	E19	H5	Total
	1	1	1	1	0	2	1	1	1	2	1	1	13
	1	1	1	3	1	1	1	0	1	0	0	1	11
	2	0	1	0	1	2	0	0	0	1	0	0	7
	3	4	4	4	3	4	2	2	3	4	2	4	39
	2	1	4	1	2	1	2	0	2	2	2	1	20
	1	1	2	1	2	1	1	1	0	2	2	2	16
	1	2	3	0	1	1	1	1	3	2	2	2	19
	0	1	0	3	3	1	1	1	1	2	0	2	15
	1	0	3	2	1	3	2	0	1	3	2	2	20
	0	0	1	1	3	1	0	2	0	2	0	2	12
	1	2	2	2	1	2	1	0	0	4	2	2	19
	2	3	3	2	1	2	2	0	0	1	1	2	19
	1	3	3	2	1	1	1	1	1	1	2	1	18
	1	0	4	1	0	0	0	1	1	1	2	2	13
	2	4	2	4	2	1	1	0	4	4	1	2	27
	1	2	1	0	2	1	1	1	1	0	1	1	12
	1	3	4	2	3	1	2	2	0	0	1	3	22
	1	1	0	4	1	2	2	1	1	2	0	2	17
	2	0	4	1	1	1	0	0	3	0	1	1	14
	1	2	0	1	1	0	1	0	2	1	0	2	11

Figure 6. Pre-Test Results By Student for Each Tested Standard

Teachers use pre-test data to chart and document student evidence of skill and standards-based learning. As mentioned in the focus groups, teachers include four questions for each standard on the pre-test and then make decisions for grouping based on the number of questions answered correctly for each standard.

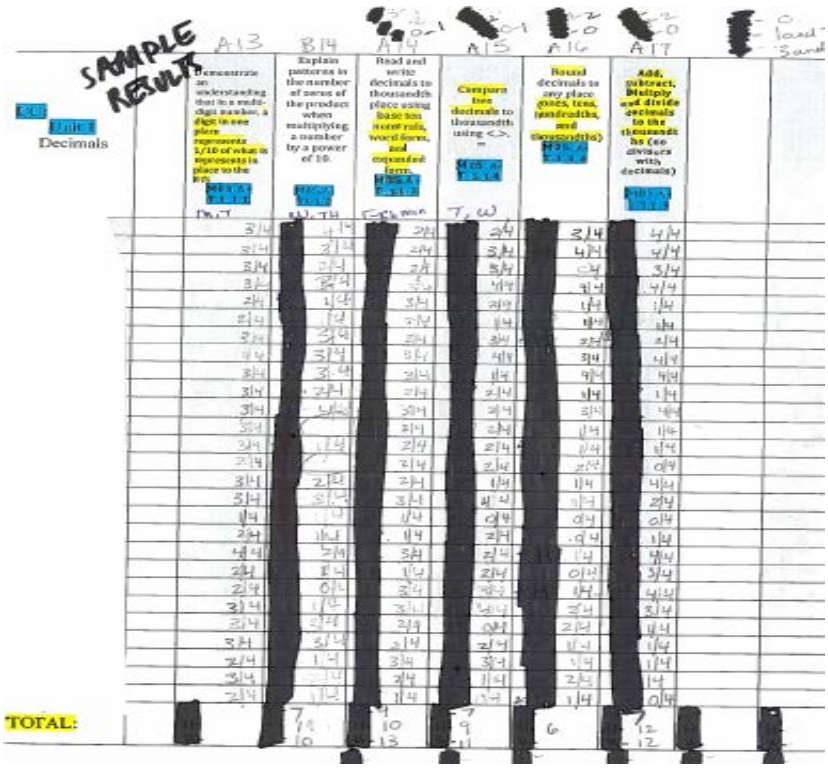


Figure 7. Pre-Test Results by Student in Grade 5 for Each Tested Standard

The charts and analysis are used to plan out appropriate flexible grouping for each skill or standard. Students then move to the appropriate group when each standard is taught. Additional examples are available in the appendix. (See Appendix G: Teacher Data Analysis and Planning Chart 1 and Appendix H: Teacher and Data Analysis and Planning Chart 2)

4.5.1.4 Standards-Based Learning.

Several analyzed documents indicated that lesson planning is focused on standards and skill attainment and not just centered on the organization of chapters in the textbook.

Standards w/Envision Lessons and CB

Unit 1:

A5 (CB Lesson 7, Envision 1-2, 1-5)
A6-A7 (CB Lesson 8, Envision 1-1, 1-2, 1-3, 1-5)
A8 (CB Lesson 9, Envision 1-4, 1-5)
A9 (CB Lesson 10, Envision 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 3-10, 13-7)
A10 (CB Lesson 13, NO ENVISION)
A11 (CB Lesson 3, Envision 2-2, 2-3, 2-4, 2-6, 3-2, 3-7, 3-8, 3-9, 4-1, 4-3, 4-5, 4-7, 4-11, 5-5, 5-6, 5-7, 5-10, 6-3, 6-4, 6-5)
A12 (CB Lesson 2, NO ENVISION) * Problem Solving Task Cards

Combine A9 and A11

Unit 2: * We also taught Order of Operations in this Unit.

B10 (CB Lesson 11, Envision 3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-7, 3-8, 3-9, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 4-11, 6-1, 6-2, 6-3, 6-4, 6-5, 7-3, 13-7)
B11 (CB Lesson 13, NO ENVISION)
A11/D7 (CB Lesson 3, Envision 2-2, 2-3, 2-4, 2-6, 3-2, 3-7, 3-8, 3-9, 4-1, 4-3, 4-5, 4-7, 4-11, 5-5, 5-6, 5-7, 5-10, 6-3 *4, 5,6, 7, 8,9, 10, 11, 6-4 *3, 4, 5, 7, 8 Part A, 6-5)

Unit 3
C7 (CB Lesson 12, Envision 5-1, 5-2, 5-4, 5-8, 5-9, 6-3, 6-4)
A10/B11
E20 (CB Lesson 3, Envision 6-3, 6-4)

Unit 4
B12 (CB Lesson 1, Envision 6-1, 6-2)
D6 (CB Lesson 2, Envision 6-5)
A11/D7/E20 (CB Lesson 3, 5-5, 5-6, 5-7, 5-10, 6-3, 6-4, 6-5)
A12/D8 (CB Lesson 2, NO ENVISION)
B10 (CB Lesson 8, Envision 7-3, 13-7)
C7 (CB Lesson 12

Unit 5 (District Unit 6) FRACTIONS
B13 (CB Lesson 4, Envision 7-1, 7-2, 7-3, 7-4, 7-5)
B10 SKIP
E7 (CB Lesson 14, Envision 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7)
E8 (CB Lesson 15, Envision 8-5, 8-6, 8-7)
E9 (CB Lesson 16, Envision 9-1, 9-3, 9-4, 9-5, 9-6, 9-7, 9-11)
E10 (CB Lesson 17, Envision 9-2)
E11 (CB Lesson 18, Envision 9-8, 9-9, 9-10)
E12 and E18 (CB Lesson 19, Envision 9-3, 9-5, 9-11, 10-6, 11-3, 13-1, 13-2, 13-3)
E13 (CB Lesson 20, Envision 10-1, 10-2, 10-3)
E14 (CB Lesson 20, Envision 10-2, 10-3)
E19 (CB Lesson 21, Envision 10-4, 10-5, 13-6)
H5 (DID NOT DO- will do in MEASUREMENT)

Unit 6 (District Unit 5) GEOMETRY
F7 (CB Lesson 36, Envision 15-1, 16-1)
F8 (CB Lesson 37, Envision 16-2, 16-3, 16-6)

Figure 8. Fourth Grade Lesson Planning Using Standards-Based Decision-Making

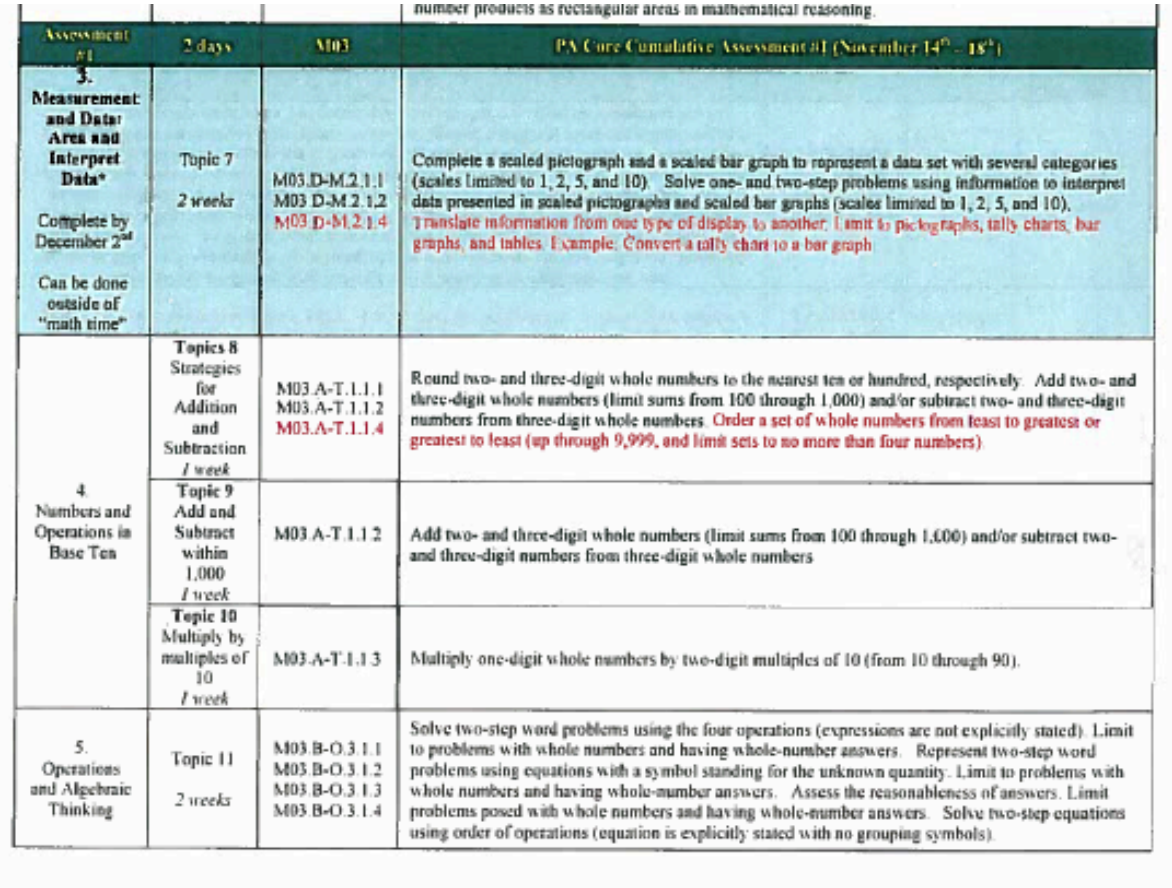
According to the documents, standards-based learning impacts how information is organized and also appears to be highly focused on student data analysis. The documents are developed using standards attainment and alignment. Student pre-test results are organized by each standard being assessed. Lessons are then planned using the analysis of the student results. An additional example is located in the appendix. (See Appendix I: Standards-based Decisions for Lesson Planning).

4.5.1.5 Teacher Lesson Planning Calendars & District Timelines.

Finally, document evidence provided two additional elements. First, teachers plan mathematics units of study with calendar organization to be able to accurately meet short and long-range deadlines and checkpoints. These team created calendars appear to assist with team planning and keep all teachers in that grade level in the communication loop.

Figure 9. Teacher Lesson Plan Calendar

Second, the teachers also relied heavily on district developed timelines to impact what topics should be addressed and how much time will be spent on skills and lessons. All the teachers mentioned these timelines in the focus group sessions.



			number products as rectangular areas in mathematical reasoning.
Assessment #1	2 days	M03	PA Core Cumulative Assessment #1 (November 14th – 18th)
3. Measurement and Data: Area and Interpret Data* Complete by December 2nd Can be done outside of "math time"	Topic 7 *2 weeks*	M03.D-M.2.1.1 M03.D-M.2.1.2 M03.D-M.2.1.4	Complete a scaled pictograph and a scaled bar graph to represent a data set with several categories (scales limited to 1, 2, 5, and 10). Solve one- and two-step problems using information to interpret data presented in scaled pictographs and scaled bar graphs (scales limited to 1, 2, 5, and 10). Translate information from one type of display to another. Limit to pictographs, tally charts, bar graphs, and tables. Example: Convert a tally chart to a bar graph.
4. Numbers and Operations in Base Ten	**Topics 8** Strategies for Addition and Subtraction *1 week*	M03.A-T.1.1.1 M03.A-T.1.1.2 M03.A-T.1.1.4	Round two- and three-digit whole numbers to the nearest ten or hundred, respectively. Add two- and three-digit whole numbers (limit sums from 100 through 1,000) and/or subtract two- and three-digit numbers from three-digit whole numbers. Order a set of whole numbers from least to greatest or greatest to least (up through 9,999, and limit sets to no more than four numbers).
	Topic 9 Add and Subtract within 1,000 *1 week*	M03.A-T.1.1.2	Add two- and three-digit whole numbers (limit sums from 100 through 1,000) and/or subtract two- and three-digit numbers from three-digit whole numbers
	Topic 10 Multiply by multiples of 10 *1 week*	M03.A-T.1.1.3	Multiply one-digit whole numbers by two-digit multiples of 10 (from 10 through 90).
5. Operations and Algebraic Thinking	Topic 11 *2 weeks*	M03.B-O.3.1.1 M03.B-O.3.1.2 M03.B-O.3.1.3 M03.B-O.3.1.4	Solve two-step word problems using the four operations (expressions are not explicitly stated). Limit to problems with whole numbers and having whole-number answers. Represent two-step word problems using equations with a symbol standing for the unknown quantity. Limit to problems with whole numbers and having whole-number answers. Assess the reasonableness of answers. Limit problems posed with whole numbers and having whole-number answers. Solve two-step equations using order of operations (equation is explicitly stated with no grouping symbols).

Figure 10. District Developed Mathematic Timeline

An additional timeline is available in the appendix. (See Appendix J: District Developed Mathematic Timeline).

4.5.1.6 State and Local Test Scores.

State testing data is a source of information regarding the impact of flexible grouping implementation. Pennsylvania System of School Assessment (PSSA, 2014, 2015, 2016) test data indicated the school achieved higher levels of achievement and growth when compared to other schools in the district, county, and state. The school ranked in the top 4% of the state for achievement and growth compared to other elementary schools for the 2014-2015 school year

(Schooldigger, 2016). The school then increased its rank by 44 places to become ranked in the top 1%, ranked #4 of the state, for achievement and growth compared to the other 1,551 elementary schools for the 2015-2016 school year (Schooldigger, 2017). There appears to be a relationship between improved test scores and instructional methods used with the implementation of flexible grouping. Internal testing, such as Classroom Diagnostic Tools (CDT), also suggests that students are learning and growing. When analyzing CDT results, a standards-based assessment administered three times a year to grades 3-5, the results of student progress are shown in the table below.

Table 6. Classroom Diagnostic Tool Assessment with Student Results

	2014-15	2015-16	2016-17
Increase in student score from Sept to May	193/198 (97%)	175/178 (98%)	*Unavailable at time of study*
Number of Students starting below grade level in Sept	27 (14%)	85 (48%)	80
Number of students starting below grade level in May	9 (5%)	14 (8%)	32 *(In January, not May, due to time of study)*

Table 6 indicates that there was a sizable increase in students starting and finishing below grade level in 2015-16 and 2016-17. The state changed to a more rigorous set of expectations and standards by incorporating PA Core Curriculum. The state assessments were then also altered to reflect these more rigorous expectations. These altered assessments also impacted internal assessments such as the CDT referenced here by changing test content and baseline expectations to better reflect state standards. These changes were reflected in the larger number of students being below grade level in the internal assessments shown in Table 6. However, the data shows

that even with the increase in more rigorous standards, a sizeable number of students performed at grade level by the end of the year.

4.5.2 Interpretive Findings of Document Collection.

Using all the document evidence, there seems to be a relationship between improved test scores and flexible grouping methodology as used in this study. Many of the documents analyzed for this study relate to statements made in the focus groups and surveys. These relationships described in the document artifacts indicated a change for the better in teaching practices such as planning and communicating, which in turn appears to have influenced student learning based on positive assessment results. The documents collected indicated there are many elements impacted when implementing flexible grouping into mathematics teaching. Each element is its own important piece that, when combined with all other factors, creates a unique and beneficial learning environment.

5.0 STUDY LIMITATIONS, IMPLICATIONS, RECOMMENDATIONS, AND REFLECTIONS

5.1 LIMITATIONS

Prior to discussing conclusions and implications of the study, it is important to examine the limitations of the study. Although the methods, data analysis plan, and data collection process were meant to reduce the number of potential limitations, some did exist. One limitation involves the element of researcher as participant. As the main researcher and also the school leader, understanding my positionality within the research was important and could have indirectly impacted results in both the survey and focus group sessions. Surveys were completely anonymous and focus groups were voluntarily formed, so as to minimize this limitation. These steps, however, do not eliminate the limitation that exists with relationships and a supervisory role that occurs between the teachers and school leader. Another limitation is the generalizability of the study findings. The sample size for the teacher survey (20 participants) and use of only one research site limits conclusions to only those evidenced through the data collected and examined. In addition, the site's use and implementation of flexible grouping may also factor into the generalizability to other elementary schools that do not have the same grade level structure, culture, or resources available. A third limitation is the necessity of common planning time. Common planning time is needed in order to plan and prepare for the

implementation of the flexible grouping process. Without this time, as some elementary schools may not have, it would prove exceptionally difficult to implement such a process as described in this study. This is why these factors were detailed as important elements suggested for implementation in order to positively affect the results of flexible grouping with mathematics. It is strongly recommended that further research be conducted in different learning environments, at different sites, and with different demographics to better understand how flexible grouping implementation impacts teaching and learning. A final limitation could be attributed to an element of fear from participants when asked to share items of importance during focus group sessions. Confidentiality was stressed to minimize this limitation, however, it must still be acknowledged as a potential factor of participant responses.

5.2 IMPLICATIONS

The purpose of this study was to uncover understandings, benefits, and disadvantages to implementing flexible grouping practices in elementary mathematics. Using the premise that action research actively involves the researcher in reflective practice, a study within the principal investigator's workplace allowed the school to focus on flexible grouping and discover strengths and weaknesses for improving student learning and teacher instruction. Several different teacher and parent perceptions regarding flexible grouping were provided within the survey and focus group analysis. Benefits to improved teaching and learning when implementing flexible grouping were described through the survey, focus groups, and document collection. Two negative opinions surfaced, within one theme of the eight discussed, from the focus group sessions. These opinions regarding flexible grouping could be interpreted as disadvantages.

There are two main implications resulting from this study. One is the implication for future research and the other is the implication for practice. The aim of this study was to determine what decisions on flexible grouping best practices and actions within the classroom improve teacher instruction and student learning.

In focusing on the implication for research, it is noted that specifics regarding this research site were clarified within the introduction and details of the study. This information can be used to see how transferable and generalizable the study results may be in different settings and demographics. Researchers agree about the value and importance of incorporating flexible grouping practices into classroom instruction (Slavin, 1985, 1987, 1993; Castle et. al, 2003; Conner et. al, 2004a, 2004b, 2007, 2009; Gamoran, 2011; Tieso, 2004; Loveless, 2013). Knowing that researchers stated different elements were important for implementation, this study addresses and identifies key elements for future research and also application. As Dweck (2007) claimed, school culture does impact the implementation of a grouping practice, including flexible grouping between elementary classrooms. This study provides additional support for that claim. Additional research in other settings would be helpful to see how different cultures impact the implementation of flexible grouping. Finally, research indicates that ability grouping and tracking do not benefit student achievement (Slavin & Karweit, 1985; Slavin, 1987; Slavin, 1993). Although, no research was conducted on this particular element within the current study, the results appear to confirm that flexible grouping did positively impact student learning. Further research is suggested to confirm this statement and also compare it with ability grouping and tracking. It is recommended that future research be completed to validate the findings from this study and also adjust for the limitations that were present within this research.

In regard to practice, I maintain that flexible grouping will yield positive learning results when implemented within a culture that values motivation, so that student development, persistence, and growth are a part of each learning experience (Dweck, 2007). I also maintain that there are key elements that should be present for the positive results to occur. Data and assessment (Gamoran, 2011), skill and needs based decision-making (Gamoran, 2011; Conner et. al., 2004a, 2004b, 2007, 2009), proper training and collaboration (Castle, Deniz, & Tortora, 2005), and curricular adjustments (Tieso, 2004) are fundamental pieces of successful flexible grouping implementation. A school that seeks to implement flexible grouping within mathematics instruction should create a positive learning culture among its staff and students, and obtain necessary resources such as staffing, common planning time, and proper scheduling. When doing so, instruction and learning will likely be positively influenced.

5.3 RECOMMENDATIONS

This experience and research study allow me the opportunity to suggest five strong recommendations for practitioners that desire to implement this process within an elementary school environment. The recommendations discussed below are based on my own experiences, the staff feedback from those that work at the elementary school, and the research study findings.

The first recommendation is the importance of consistency in leadership within the building. I have worked in the building for ten years and during that time I was able to initiate and nurture the process of flexible grouping. Leadership during such an initiative requires time to cultivate the process. A leader needs to be willing to stick with it and gradually look for

change and progress. Without this consistency, it is far less likely that this process will develop into a system that is self-sufficient or meaningful.

A second recommendation is the importance of the development of the culture within the building. The ability of the staff to collaborate and trust each other when implementing flexible grouping strategies is essential. For us, it started small with a few teachers that wanted to engage in such a change. It then grew with more teacher interest based on colleague discussion, observation, and student progress and results. Entire grade levels became engaged in the process and eventually, the entire building transformed into believers in the value of the process. This development of the culture is a necessary part of being able to work together and put trust in colleagues to be a team.

A third recommendation for implementation is the ability of a leader to be aware of the impact changes in staffing have on the process. The school leader should have plans in place that help support new staff and train them to better understand and engage in implementation of the flexible grouping process. The plans need to include mentoring on the part of the leader as well as from the grade level team that the new teacher is joining. I currently hold monthly new teacher meetings that include teachers new to the profession or new teachers to the building that may have taught elsewhere. During common planning team meetings, I visit teams on a rotational basis to check in on their discussions, view their agendas, and support their progress with suggestions and action items. I ask that the grade level teams also engage across grade levels so that new teachers can learn how their planning and instruction impacts the next grade level and also learn about the students coming in from a previous grade. This process can be very overwhelming for new staff, as we have discovered over time. Utilizing flexible grouping, with all the important elements mentioned in the study, can be very overwhelming for new staff.

We have found it is unfamiliar territory and not something that is taught in teacher preparation programs.

A fourth recommendation for implementation is the need for a structured staff professional development model. When we first began this process with several teachers, there was a lot of conversation around meeting students' individual needs and what that might look like in a classroom setting. This is when we read and studied the concept of mass customized learning (MCL), developed within the book *Inevitable* (Schwahn & McGarvey, 2011). The book study generated ideas and a starting point for a model that would work for our setting and demographics. From there, we worked tirelessly at how data analysis becomes an essential piece of the common planning time within the grade. Learning how to properly analyze data and use the results in a beneficial way can be challenging. However, with regular discussions and modeling, teachers are able to create data charts that help them analyze the information to make decisions for instruction and learning. Another important use of professional development is for teacher leaders to train their colleagues. We allowed teachers to observe other teachers in the building teaching and also planning during common time to help them understand how flexible grouping can occur and how it affects the instruction. We also encouraged other grade levels to "try it out", similar to a pilot program. By doing this, we generated a culture where failure was encouraged and teachers would learn from their own mistakes. Over time, the teachers have gotten better and better at implementing flexible grouping and each year they have added additional elements to the process.

A fifth and final recommendation is that of grading. Our school still utilizes a traditional grading system that is points based and uses a letter scale. I am recommending that due to the constant movement in student placement and measuring student progress by skill and standard, it

would behoove a school to utilize standards-based grading. Standards based grading would allow teachers the ability to report about student progress as proficiency in each standard area. When students are in constant movement from one staff member to another, it does make tracking their learning challenging. If a school were to use a standards-based grading model, each teacher would be able to report about the skill and standard at the time of instruction in terms of proficiency and mastery. I believe this to be a more meaningful grading system applied to the flexible grouping process.

5.4 REFLECTIONS

Through this study and experience, I believe the findings indicate that the implementation of flexible grouping has positively impacted my role as a school leader, as well as, the teaching and learning of the students and staff. I have learned about myself as a leader, what I value as important, and how others react to my leadership and initiatives. I have also learned that when we focused on one process or strategy, it impacts so many other important elements in our educational process. When we started to implement flexible grouping strategies, I could not have predicted how many other elements of teaching and learning would be affected. Lesson planning, common planning time, data analysis, collaboration, colleague relationships, and teacher instruction were all affected. We were also able to receive favorable feedback from our district middle schools. Some teachers have shared with us that our students are better prepared moving into middle school.

This process has enabled us to make better decisions regarding student learning, empowered staff to focus on teaching and learning, and effectively work as a team. We have

developed a culture with a foundation built on motivation, the growth mindset, and learning collaboratively. Additionally, this process has shown continuous results that are positive for learning and growth.

This study, coupled with my work as a principal and leader, has increased my understanding of the impact of flexible grouping on mathematics. Our school now utilizes flexible grouping practices in other academic areas such as reading instruction. We have transformed the way we educate students by focusing on flexible grouping and personalized education. We meet student needs through targeted interventions, a team approach, and collaborative team planning focused on data driven, lesson planning. We have found that when we use the data available to us, we are meeting students' individual needs, similar to customized learning. Overall, due to the many positive outcomes that have come from the implementation of flexible grouping, it is hard to imagine working in a school that does not engage in this process. My own belief in the value of flexible grouping has altered how I view educating students in order to benefit teacher instruction and student learning. The flexible grouping process has become a way of life for our staff, students, and parents. Ultimately, flexible grouping has become what I believe to be the most beneficial process for teacher instruction and student learning that I have implemented thus far in my career. This research study allowed me to recognize the value of flexible grouping and its impact on my role as an instructional leader. As a school leader, this study has called attention to the most important elements that impact teaching and learning and helped me to focus on those elements for staff development. I plan to share information, and my recommendations, with others regarding how flexible grouping in elementary mathematics has a positive impact on teaching and learning.

APPENDIX A

TEACHER SURVEY IN QUALTRICS ON FLEXIBLE GROUPING IN ELEMENTARY MATHEMATICS

Hello,
My name is Karin Coiner, and I am a doctoral student at the University of Pittsburgh. I am also an elementary principal in Westmoreland County, PA. I am conducting a dissertation research study on the topic of flexible grouping in elementary mathematics and its impact on teaching and learning. This email is an invitation for you participate in this brief survey. I am sending it to teachers and parents that have experience with flexible grouping.

I know how busy you are and how the many demands of our daily lives require considerable time and attention. Therefore, this survey is intentionally brief and may take you around ten minutes to complete. This link below will take you to the survey:

Please know that you will incur minimal risk through this study and may decline to answer any questions during the survey. The primary potential risk is a breach of confidentiality, but everything possible will be done to protect your privacy. All records pertaining to your involvement in this study will be kept locked, and any data that includes your identity will be stored in secured files. Your identity will not be revealed in any description or publication of the research. Individual responses will not be shared in any way that is harmful.

One of the survey questions asks if you would be willing to participate in a follow-up interview or focus group. This interview or focus group contains questions about what, how, and when you have experienced flexible grouping practices. I expect our interview conversation to last no longer than thirty minutes and a focus group around an hour. If you are willing to be considered for an interview or participate in a focus group, please provide your name and contact information when prompted by the survey.

Thank you for your consideration and assistance. If you have any questions, please feel free to contact me via email (kec145@pitt.edu) or by phone at 724-422-4069. I appreciate your assistance in this study.

Sincerely,
Karin E. Coiner

Karin E. Coiner
Email: kec145@pitt.edu
Phone: 724-422-4069

Dr. R. Gerard Longo, Ph.D., Dissertation Advisor
University of Pittsburgh
Email: longoj@pitt.edu
Phone: 412-648-1937

This study is entitled, "Flexible Grouping within Elementary Mathematics". The purpose of this research study is to understand how the implementation of flexible grouping in elementary mathematics impacts teaching and learning. For that reason, I am surveying teachers and parents that have experiences with flexible grouping practices. This survey will ask about your professional background and your experiences with flexible grouping. These topics are captured in seven questions, and the complete survey will take you approximately ten minutes to complete. The survey ends by asking if you are willing to be considered for a follow-up interview or focus group. If you are willing, you will type your name, phone number, email, and preference so that you can be contacted.

All responses are confidential, and results will be secured and accessed only by the researcher. Your participation is voluntary, and you may withdraw at any time. The data collected by this research project may be shared with investigators conducting similar research; however, this information will be shared in a de-identified manner. The completion of this survey implies your consent to participate.

The survey begins on the next page. Thank you.

1. What is your role in your school's implementation of flexible grouping?

A. Grade Level Teacher
B. Non-Teaching Professional
C. Support Staff member
D. Other (please provide)

2. How many total years have you been teaching? Include the 2016-2017 school year in your answer.

3. Do you feel that you understand the definition of flexible grouping?
A. Yes
B. No

C. Unsure

4. How often do you utilize flexible grouping practices in mathematics?
A. Daily
B. Weekly
C. Monthly
D. Sporadically
E. Never

5. Using the research of Dweck and Repuccci (1973), Diener and Dweck (1978), Dweck (1986), along with Tice (1997), two factors can play a role on the implementation of flexible grouping. The theory of learned helplessness and school culture both impact the success of flexible grouping practices within a school.

Please complete this statement for each item listed.

The implementation of flexible grouping _____

Positively affects/ Somewhat affects/ Neither affects nor prevents/ Somewhat prevents/ Greatly prevents / Unsure

A. the learning of all students
B. the learning of students above grade level
C. the learning of students on grade level
D. the learning of students below grade level
E. my instruction
F. my lesson design
G. my collaboration with colleagues
H. my use of data analysis
I. my use of instructional time
J. grade level assessment results

6. According to literature on grouping practices, Slavin (1985, 1987, 1993), Slavin and Karweit (1985), Castle, Deniz, and Tortora (2005), Gamoran (2011), Tieso (2004), Conner et al. (2004a, 2004b, 2007, 2009), there are common elements that appear in flexible grouping practices. These elements are listed below.

Pick and drag four elements below into the box to the right. Please select the four flexible grouping practices that appear in the literature that you believe to most likely result in an improvement in teaching and learning. Then, rank order this list of four in the box by moving the items into a vertical list. Place the item that you believe to most likely lead to improved teaching and learning at the top. Position the remaining items underneath the top item in descending order.

Grade Level Team Collaboration
Team Planning
Data Analysis

Student Learning
Lesson Planning
Lesson Design
Individualized Learning
School Culture
Math Resources (tools)
Parent Support

7. Are you willing to participate in a brief follow-up interview or a focus group? If you answer "Yes," you will continue to the next question that asks your name and contact information. If you answer "No," you will be directed out of the survey.

8. In the space below, please type your name, your email, a contact phone number, and whether you would be willing to participate in an interview, focus group, or both.

Please also note the best time of the day for me to call you.

Thank you for participating in this survey about flexible grouping practices. I appreciate your time and your willingness to share this information with me.

APPENDIX B

PARENT SURVEY IN QUALTRICS ON FLEXIBLE GROUPING IN ELEMENTARY MATHEMATICS

Hello,
My name is Karin Coiner, and I am a doctoral student at the University of Pittsburgh. I am also an elementary principal in Westmoreland County, PA. I am conducting a dissertation research study on the topic of flexible grouping in elementary mathematics and its impact on teaching and learning. This email is an invitation for you participate in this brief survey. I am sending it to teachers and parents that have experience with flexible grouping.

I know how busy you are and how the many demands of our daily lives require considerable time and attention. Therefore, this survey is intentionally brief and may take you around ten minutes to complete. This link below will take you to the survey:

Please know that you will incur minimal risk through this study and may decline to answer any questions during the survey. The primary potential risk is a breach of confidentiality, but everything possible will be done to protect your privacy. All records pertaining to your involvement in this study will be kept locked, and any data that includes your identity will be stored in secured files. Your identity will not be revealed in any description or publication of the research. Individual responses will not be shared in any way that is harmful.

One of the survey questions asks if you would be willing to participate in a follow-up interview or focus group. This interview or focus group contains questions about what, how, and when you have experienced flexible grouping practices. I expect our interview conversation to last no longer than thirty minutes and a focus group around an hour. If you are willing to be considered for an interview or participate in a focus group, please provide your name and contact information when prompted by the survey.

Thank you for your consideration and assistance. If you have any questions, please feel free to contact me via email (kec145@pitt.edu) or by phone at 724-422-4069. I appreciate your assistance in this study.

Sincerely,
Karin E. Coiner

Karin E. Coiner
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Dr. R. Gerard Longo, Ph.D., Dissertation Advisor
University of Pittsburgh
Email: longoj@pitt.edu
Phone: 412-648-1937

This study is entitled, "Flexible Grouping within Elementary Mathematics". The purpose of this research study is to understand how the implementation of flexible grouping in elementary mathematics impacts teaching and learning. For that reason, I am surveying teachers and parents that have experiences with flexible grouping practices. This survey will ask about your professional background and your experiences with flexible grouping. These topics are captured in seven questions, and the complete survey will take you approximately ten minutes to complete. The survey ends by asking if you are willing to be considered for a follow-up interview or focus group. If you are willing, you will type your name, phone number, email, and preference so that you can be contacted.

All responses are confidential, and results will be secured and accessed only by the researcher. Your participation is voluntary, and you may withdraw at any time. The data collected by this research project may be shared with investigators conducting similar research; however, this information will be shared in a de-identified manner. The completion of this survey implies your consent to participate.

The survey begins on the next page. Thank you.

1. What grade level is your child currently enrolled?

2. How many total years has your child attended this school? Include the 2016-2017 school year in your answer.

3. Do you feel that you understand the definition of flexible grouping?
A. Yes
B. No
C. Unsure

4. How often does your child speak about mathematics class at home?
A. Daily

B. Weekly
C. Monthly
D. Sporadically
E. Never

5. Using the research of Dweck and Reppucci (1973), Diener and Dweck (1978), Dweck (1986), along with Tice (1997), two factors can play a role on the implementation of flexible grouping. The theory of learned helplessness and school culture both impact the success of flexible grouping practices within a school.

Complete this statement for each item listed.

The implementation of flexible grouping _____

Positively affects/ Somewhat affects/ Neither affects nor prevents/ Somewhat prevents/ Greatly prevents / Unsure

A. the learning of all children
B. the learning of other children
C. the learning of some children
D. the learning of my child
E. my child's experience in class
F. my child's view of mathematics class
G. the needs of my child in mathematics
H. how my child speaks about mathematics

6. Are you willing to participate in a brief follow-up interview or a focus group? If you answer "Yes," you will continue to the next question that asks your name and contact information. If you answer "No," you will be directed out of the survey.

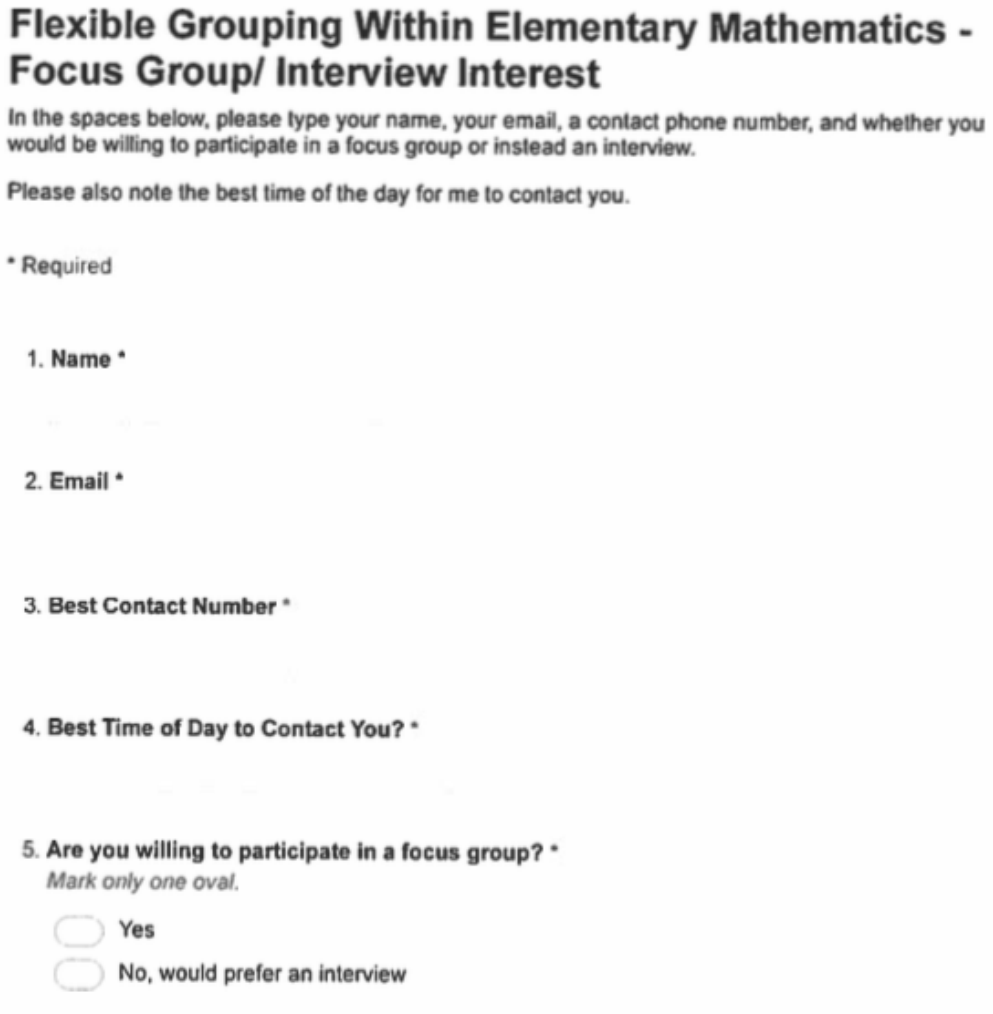
7. In the space below, please type your name, your email, a contact phone number, and whether you would be willing to participate in an interview, focus group, or both.

Please also note the best time of the day for me to call you.

Thank you for participating in this survey about flexible grouping practices. I appreciate your time and your willingness to share this information with me.

APPENDIX C

GOOGLE FORMS FOR FOCUS GROUP PARTICIPANT CONTACT INFORMATION



Flexible Grouping Within Elementary Mathematics - Focus Group/ Interview Interest

In the spaces below, please type your name, your email, a contact phone number, and whether you would be willing to participate in a focus group or instead an interview.

Please also note the best time of the day for me to contact you.

* Required

1. **Name** *

2. **Email** *

3. **Best Contact Number** *

4. **Best Time of Day to Contact You?** *

5. **Are you willing to participate in a focus group?** *
Mark only one oval.
- Yes
- No, would prefer an interview

Figure 11. Google Form For Focus Group Participant Contact Information

APPENDIX D

TEACHER FOCUS GROUP PROTOCOL

CONSENT FORMS FILLED OUT BEFORE FOCUS GROUP BEGINS.

Good afternoon/evening. Thank you for taking the time to join my discussion of flexible grouping in elementary mathematics at Sunrise Elementary. This group will assist me to complete a research study on this topic for my dissertation for the University of Pittsburgh.

My name is Karin Coiner and I am the moderator. I am conducting research on how flexible grouping impacts teaching and learning in elementary mathematics. I hope to learn how individuals perceive and implement the flexible grouping process, along with how it affects teaching and learning.

I want to talk to you about your experiences with flexible grouping in this school. I will be asking you about your perceptions and implementation on what flexible grouping is, what it looks like, how to plan for it, and your thoughts on its impact.

Before we begin, let me suggest some things to make our discussion more productive. Because I will be recording for an accurate record, it is important that you speak up and that each of you speak one at a time. I don't want to miss any of your comments.

I will only use first names here. No reports will link what you say to your name, this school, or this district. In this way, I will maintain your confidentiality. In addition, I ask that you also respect the confidentiality of everyone here. Please don't repeat who said what when you leave this room.

During the time that we will be here, I will ask you questions and I will listen to what you have to say. I will not participate in the discussion. So, please, feel free to respond to each other and to speak directly to others in the group.

I want to hear from all of you. I am interested in both majority and minority viewpoints, common and uncommon experiences. So, I may sometimes act as a traffic cop by encouraging someone

who has been quiet to talk, or by asking someone to hold off for a few minutes.

Interview question format tied to literature: Patton (2002) suggests six types of questions to generate answers from the interviewee. Those questions are: experience and behavior questions, opinion and value questions, feeling questions, knowledge questions, sensory questions, and background/demographic questions. Below are questions that meet several of these types in order to generate more rich information during the semi-structured interview.

If it is okay with you, I will turn on the recorder and start now.

This teacher focus group is being conducted on _____ by Karin Coiner.
The recording identification name/number are _____/ _____.
Start time: _____ End time: _____

Let's begin with introductions.
A. Please tell me your first name, what grade you teach, and how long you have been teaching.

Now that we know a little bit about you, I would like you to think about your experiences implementing flexible grouping in mathematics in this school.

B. Can you tell me about your experiences with flexible grouping when you teach mathematics?

Flexible grouping, mentioned by George (2005), encourages interactions with different sets of peers. This varying interaction eliminates the perceptions of tracking or ability grouping and enables the school culture to embrace learning for skill need and not on preconceived ability. George (2005) contends that when teachers are made aware of individual differences they can provide more opportunities for growth and development (p. 187).

Probing Questions:
Tell me more about how flexible grouping impacts your teaching?

Tell me more about how flexible grouping impacts student learning?

C. How would you explain flexible grouping to a new teacher or to a parent?

Valentino (2014) defines flexible grouping in this way, "where students of varying ages, backgrounds, and abilities were grouped and regrouped to meet instructional needs".

Probing Questions:
What do you feel is the definition of flexible grouping?

What does flexible grouping look like to a student?

What does flexible grouping look like to a teacher?

D. What key elements do you need to make flexible grouping in mathematics work?

According to literature on grouping practices, Slavin (1985, 1987, 1993), Slavin and Karweit (1985), Castle, Deniz, and Tortora (2005), Gamoran (2011), Tieso (2004), Conner et al. (2004a, 2004b, 2007, 2009), there are common elements that appear in flexible grouping practices.

Probing Question:

What kind of support is needed for successful implementation?

What resources do you need?

What materials do you need?

E. Tell me about how flexible grouping impacts your interactions with your colleagues?

Using the research of Dweck and Reppucci (1973), Diener and Dweck (1978), Dweck (1986), along with Tice (1997), two factors can play a role on the implementation of flexible grouping. The theory of learned helplessness and school culture both impact the success of flexible grouping practices within a school. Using these frameworks, how teachers interact with colleagues is linked to school culture and teachers' view of student success.

Probing Questions:

Does it affect your planning?

Does it affect how you analyze data?

Does it affect how you communicate with your colleagues?

Does it affect your time management?

Does it affect conversations in the building**?**

APPENDIX E

PARENT FOCUS GROUP PROTOCOL

CONSENT FORMS FILLED OUT BEFORE FOCUS GROUP BEGINS.

Good afternoon/evening. Thank you for taking the time to join my discussion of flexible grouping in elementary mathematics at Sunrise Elementary. This group will assist me to complete a research study on this topic for my dissertation for the University of Pittsburgh.

My name is Karin Coiner and I am the moderator. I am conducting research on how flexible grouping impacts teaching and learning in elementary mathematics. I hope to learn how individuals perceive and implement the flexible grouping process, along with how it affects teaching and learning.

I want to talk to you about your experiences with flexible grouping in this school. I will be asking you about your perceptions on what flexible grouping is, how it affects your child, what is discussed with your child, and your thoughts on its impact.

Before we begin, let me suggest some things to make our discussion more productive. Because I will be recording for an accurate record, it is important that you speak up and that each of you speak one at a time. I don't want to miss any of your comments.

I will only use first names here. No reports will link what you say to your name, this school, or this district. In this way, I will maintain your confidentiality. In addition, I ask that you also respect the confidentiality of everyone here. Please don't repeat who said what when you leave this room.

During the time that we will be here, I will ask you questions and I will listen to what you have to say. I will not participate in the discussion. So, please, feel free to respond to each other and to speak directly to others in the group.

I want to hear from all of you. I am interested in both majority and minority viewpoints, common and uncommon experiences. So, I may sometimes act as a traffic cop by encouraging someone who has been quiet to talk, or by asking someone to hold off for a few minutes.

Interview question format tied to literature: Patton (2002) suggests six types of questions to generate answers from the interviewee. Those questions are: experience and behavior questions, opinion and value questions, feeling questions, knowledge questions, sensory questions, and background/demographic questions. Below are questions that meet several of these types in order to generate more rich information during the semi-structured interview.

If it is okay with you, I will turn on the recorder and start now.

This parent focus group is being conducted on _____ by Karin Coiner.
The recording identification name/number are _____/ _____.
Start time: _____ End time: _____

Let's begin with introductions.
A. Please tell me your first name, the grade your child is currently in, and how long your child has been attending Sunrise Elementary.

Now that we know a little bit about you, I would like you to think about your experiences with flexible grouping in mathematics in this school.

B. Can you tell me about your child's experiences with flexible grouping in mathematics?

Flexible grouping, mentioned by George (2005), encourages interactions with different sets of peers. This varying interaction eliminates the perceptions of tracking or ability grouping and enables the school culture to embrace learning for skill need and not on preconceived ability. George (2005) contends that when teachers are made aware of individual differences they can provide more opportunities for growth and development (p. 187).

Probing Questions:

Tell me more about how flexible grouping impacts your child?

Tell me more about how flexible grouping impacts your child's learning?

C. How would you explain flexible grouping to a parent that is new to this school?

Valentino (2014) defines flexible grouping in this way, "where students of varying ages, backgrounds, and abilities were grouped and regrouped to meet instructional needs".

Probing Questions:

What do you feel is the definition of flexible grouping?

What does flexible grouping look like to your child?

What does flexible grouping look like to you?

D. What key elements do you need feel your child needs in mathematics to progress in his/her learning?

According to literature on grouping practices, Slavin (1985, 1987, 1993), Slavin and Karweit (1985), Castle, Deniz, and Tortora (2005), Gamoran (2011), Tieso (2004), Conner et al. (2004a, 2004b, 2007, 2009), there are common elements that appear in flexible grouping practices.

Probing Question:

What kind of support is needed for your child to learn in math?

What does your child talk about at home regarding math class?

APPENDIX F

FOCUS GROUP CONSENT FORM

Consent Form for Study: Flexible Grouping Within Elementary Mathematics

You are being asked to take part in a research study of flexible grouping in elementary mathematics at Sunrise Elementary. We are asking you to take part because you expressed a willingness to do so when you completed the survey online for this study. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The purpose of this study is how flexible grouping impacts teaching and learning in elementary mathematics. I hope to learn how individuals perceive and implement the flexible grouping process, along with how it affects teaching and learning.

What we will ask you to do: If you agree to be in this study, I will conduct a focus group with you and approximately 2-3 other participants. The focus group will include questions about basic background data, your understanding of flexible grouping, the key elements present in flexible grouping, and the building culture present with regard to flexible grouping. The focus group will take about 30-45 minutes to complete. With your permission, I would also like to audio-record the focus group.

Risks and benefits: Please know that you will incur minimal risk through this study and may decline to answer any questions during this focus group. If you feel at any time that the questions are too personal, you may decline to answer at any time. The primary potential risk is a breach of confidentiality, but everything possible will be done to protect your privacy. Individual responses will not be shared in any way that is harmful. At no point will participation have an impact on employment or evaluation for teachers that choose to participate. There is no direct benefit to participating in this survey. There may be societal benefit in terms of improving educational practice. The University of Pittsburgh values student and doctoral researchers and I hope to learn more about practitioner instruction and pedagogy.

Your answers will be confidential. The records of this study will be kept private. In any sort of report I make public, I will not include any information that will make it possible to identify you. Your identity will not be revealed in any description or publication of the research. De-identified data may be shared with other researchers. Research records will be kept in a locked file or on a password protected computer; only the researcher will have access to the records. Per University of Pittsburgh policy, all research records must be maintained for at least 7 years following final reporting or publication of a

project. Authorized representatives from the University of Pittsburgh Research Conduct and Compliance Office may review your data solely for the purpose of monitoring the conduct of this study.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part or to skip some of the questions, it will not affect your current or future relationship with the University of Pittsburgh, the Penn-Trafford School District, or Sunrise Elementary. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researcher conducting this study is Karin Coiner and supervising Professor Dr. Jerry Longo. Please ask any questions you have now. If you have questions later, you may contact Karin Coiner at kec145@pitt.edu or at 724-422-4069. You can reach Dr. Longo at longoj@pitt.edu or 412-648-1937. If you have any questions about your rights as a research subject or wish to talk to someone other the research team, please call the University of Pittsburgh Human Subjects Protection Advocate toll-free at 866-212-2668.

You will be given a copy of this form to keep for your records.

Statement of Consent:

The information on the previous page has been explained to me and all of my current questions have been answered. I understand that I am encouraged to ask questions, voice concerns or complaints about any aspect of this research study during the course of this study, and that such future questions, concerns or complaints will be answered by a qualified individual or by the investigator listed on the first page of this consent document at the telephone number given.

I understand that I may always request that my questions, concerns or complaints be addressed by a listed investigator. I understand that I may contact the Human Subjects Protection Advocate of the IRB Office, University of Pittsburgh (1-866-212-2668) to discuss problems, concerns, and questions; obtain information; offer input; or discuss situations that occurred during my participation. By signing this form I agree to participate in this research study. A copy of this consent form will be given to me.

Your Signature _____ Date _____

Your Name (printed) _____

In addition to agreeing to participate, I also consent to having the focus group audio-recorded.

Your Signature _____ Date _____

Signature of person obtaining consent _____ Date _____

Printed name of person obtaining consent _____ Date _____

This consent form will be kept by the researcher for at least seven years beyond the end of the study.

I certify that I have explained the nature and purpose of this research study to the above-named individual, and I have discussed the potential benefits and possible risks of study participation. Any questions the individual have about this study have been answered, and I will always be available to address future questions, concerns or complaints as they arise. I further certify that no research component of this protocol was begun until after this consent form was signed.

Karin E. Coiner	Principal Investigator
Printed Name of Person Obtaining Consent	Role in Research Study
_____	_____
Signature of Person Obtaining Consent	Date

APPENDIX G

TEACHER DATA ANALYSIS AND PLANNING CHART 1

SAMPLE PRE-TEST RESULTS

Test Name: 2016-17 [redacted] Unit 7 Pretest (Measurement and Data: Time, Capacity, and Mass)
Test Id: [redacted]
Total Students: [redacted]
School Name: [redacted]
Teacher Name: [redacted]
Course/Section: [redacted]
Summary Report - Multiple Choice Questions

						Questions															
Standards						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Questions - % correct						85.71%	83.67%	69.39%	65.31%	81.63%	83.67%	40.82%	42.86%	83.67%	83.67%	24.49%	89.80%	83.67%	71.43%	73.47%	75.51%
Question DOK																					
Student Id	Last Name	First Name	Total Pts Possible	Mc Correct	Essay Points	Total % Score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Correct Answer							D	B	B	C	B	A	C	C	D	C	A	C	D	B	B	A
			16	10	0	62.5%	B	A						B			B		B		C	
			16	8	0	50%	B	A					A	A			D	D		C		B
			16	8	0	50%				A	A	C	D	B			B			C		C
			16	7	0	43.75%	B		A	A	C		D	D			C	D		A		
			16	14	0	87.5%							D				C					
			16	11	0	68.75%			-	A			D	A			D					
			16	11	0	68.75%								D			C	D		A	D	
			16	15	0	93.75%											C					
			16	6	0	37.5%			C			C	A	A	B	B	C			C	A	D
			16	6	0	37.5%					C	B	D	A		B	C		C	A	C	C
			16	14	0	87.5%									A		C					
			16	13	0	81.25%							B	D			C					
			16	14	0	87.5%								A			C					
			16	11	0	68.75%					C	C	D	A			C					
			16	16	0	100%																
			16	12	0	75%		A		B				A							D	
			16	15	0	93.75%				B												
			16	8	0	50%				A		B	D	A		A	D		B	A		
			16	14	0	87.5%			C								C					
			16	10	0	62.5%				A				A		A				D	D	C
			16	16	0	100%																

Figure 12. Teacher Data Analysis and Planning Chart 1

APPENDIX H

TEACHER DATA ANALYSIS AND PLANNING CHART 2

Figure 13. Teacher Data Analysis and Planning Chart 2

APPENDIX I

STANDARDS-BASED DECISIONS FOR LESSON PLANNING

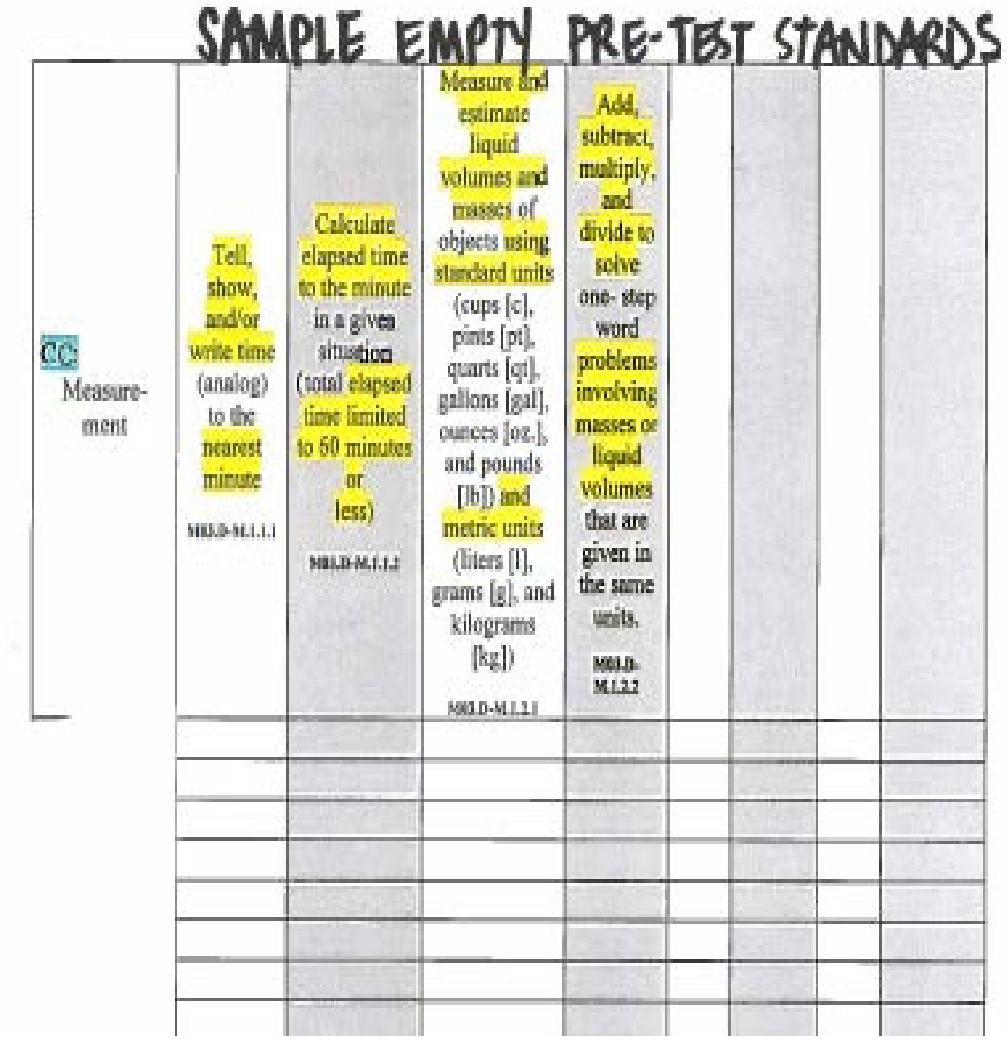


Figure 14. Example of Standards Based Decision For Lesson Planning

APPENDIX J

DISTRICT DEVELOPED MATHEMATIC TIMELINE

Unit	Time	PA Core	Major Concepts
CD1	2 days	M04	Classroom Diagnostic Test
1. Base Ten Operations	Topic 1, 2 *4 weeks*	M04.A-T.1.1.1 M04.A-T.1.1.2 M04.A-T.1.1.3 M04.A-T.1.1.4 M04.A-T.2.1.1 M04.A-T.2.1.4 M04.B-O.1.1.3 M04.B-O.1.1.4	Demonstrate an understanding that in a multi-digit whole number (through 1,000,000), digit in one place represents ten times what it represents in the place to its right, read and write whole numbers in standard, expanded, and word form up to 1,000,000, compare two multi-digit numbers through 1,000,000 based on meanings of the digits in each place, using >, =, and < symbols, round through 1,000,000, add/subtract up to 1,000,000, estimate answers up to six digits, solve multi-step word problems posed with whole numbers using the four operations, answers will be either whole numbers or have remainders that must be interpreted yielding a final answers that is a whole number represent these problems using equations with a symbol or letter standing for the unknown quantity, identify the missing symbol (+, −, x, ÷, <, >, =) that makes a number sentence true, integers *(glossary item only)*, subtrahend: the expression subtracted from another expression *(glossary item only)*
2. Multiplication	Topics 3,4 *4 weeks*	M04-A-T.2.1.2 M04.A-T.2.1.4 M04.B-O.1.1.3	Multiply a whole number up to four-digits by a whole number up to two-digits, estimate answers up to six digits, solve multi-step word problems posed with whole numbers using the four operations, answers will be either whole numbers or have remainders that must be interpreted yielding a final answers that is a whole number represent these problems using equations with a symbol or letter standing for the unknown quantity
3. Division	Topics 5 *2 weeks*	M04.A-T.2.1.3 M04.A-T.2.1.4 M04.B-O.1.1.3	Divide up to four-digit dividends by one-digit divisors with answers as whole number quotients and remainders, estimate answers up to six digits, solve multi-step word problems posed with whole numbers using the four operations, answers will be either whole numbers or have remainders that must be interpreted yielding a final answers that is a whole number represent these problems using equations with a symbol or letter standing for the unknown quantity, unit price *(glossary item only)*
4. Problem Solving	Topics 6 *2 weeks*	M04.B-O.1.1.1 M04.B-O.1.1.2 M04.B-O.1.1.3 M04.B-O.1.1.4 M04-A-T.2.1.2 M04.A-T.2.1.3	Interpret a multiplication equation as a comparison represent verbal statements of multiplicative comparisons as multiplication equations, multiply or divide to solve word problems involving multiplicative comparisons, solve multi-step word problems posed with whole numbers using the four operations, answers will be either whole numbers or have remainders that must be interpreted yielding a final answers that is a whole number represent these problems using equations with a symbol or letter standing for the unknown quantity, identify the missing symbol (+, −, x, ÷, <, >, =) that makes a number sentence true, multiply a whole number up to four-digits by a whole number up to two-digits, divide up to four-digit dividends by one-digit divisors with answers as whole number quotients and remainders
Assessment #1	2 days	M04	PA Core Cumulative Assessment #1 (November 21st – 30th)
			Find all factor pairs for a whole number in the interval 1 through 100, recognize that a whole

Figure 15. District Developed Mathematic Timeline

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